172474
AUG 18 1887
SMITHSONIAN DEPOSIT

THE AMERICAN GAS LIGHT JOURNAL

REDMANKENNY,N.Y.

PUBLISHING OFFICE No. 42 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, VENTILATION, WATER SUPPLY AND DISTRIBUTION, & GENERAL SCIENCE.

VOLUME XLVII.—No. 4. Whole No. 676. | NEW YORK, TUESDAY, AUGUST 16, 1887. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager.
JOS. R. THOMAS, C.E., Editor. T. J. CUNNINGHAM, Asst. Editor.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y. AS SECOND CLASS MATTER.

Published on the 2d and 16th of each month, at No. 42 Pine Street, N. Y.

Terms of Subscription, Including Postage.—For the United States and Canada, $3 per annum. European countries, $3.50 (15 shillings—18 francs). All payments to be made in advance. Single copies, 15 cents.

Remittances should be made either by post-office order, registered letter, or bank draft on New York, payable to the order of A. M. Callender & Co.

Correspondence.—Wishing to make this JOURNAL a gazette of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, correspondence is solicited for publication from all who make the study of those subjects a pleasure or a profession.

The American News Company, Nos. 39 and 41 Chambers street, New York, are agents for this JOURNAL. Newsdealers will send orders to them.

Collections are invariably made directly from this office, for subscriptions, advertisements, etc. We have agents to solicit the same, but they are not authorized to receipt for money.

Books.—We will forward by express, at publisher's lowest rates, any book—scientific or otherwise—to any address in the United States or Canada. No books will be sent C. O. D.

CONTENTS.

An Asterisk (*) denotes an illustrated article.

OFFICIAL NOTICE—
American Gas Light Association..... 97

EDITORIALS—
Progress in the Matter of the Proposed Gas Institute..... 98
Levey's Electric Light Primer..... 98
Papers Read at the Recent Meeting of the British Gas Institute..... 99
*Coke, by Charles Gandon, 99—Gas Coke as a General Fuel, by C. E. Jones, 101.
Tests of Refrigerating Apparatus..... 104
*Humphrys' Patent Damper Frame for Furnaces..... 105
*Richard Brothers' Standard Gas Gauges..... 106

ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 106
Work in Progress at La Crosse, Wis.—Electric Light at Kingston, Can.—Turned on at Quebec, Can.—To be Lighted by Gas—Likely to be Consolidated—Dividend Declared—Important Patent Litigation—Death of the President of the Davenport (Iowa) Gas Company—Baptized Anew—Improvements at Adams, Mass.—A Queer Case—One Result of the Brooklyn (N. Y.) Gas Rate—The Waterhouse Electric Lighting System—The Annual Report, English Patent Office—New Public Works at Canton, Dak. Ter.—Gaseous Doings at Des Moines, Iowa—Capital Increased—To Supply Electric Light—At Work on the Station—In Regard to the Sale of the Oneida (N. Y) Gas Light Company—Proposed New Gas Company—To Build a New Station Meter—Lowell's New Holder—Suit against the County of Galveston, Texas—Brother Dennis-ton at it Again—Oil City (Pa.) Gas Rates—Street Lighting at Belleville, Ills.—Public Lighting at Detroit, Mich.—Messrs. P. H. & F. M Roots Preparing for a Busy Season—Personal—New Gas Company—And yet Another—Messrs. R. & J. Dempster to Do the Work—A Word or Two from Wheeling, W. Va—Interesting Figures—Going on with the Good Work—To Light the City's Wharves—Postponed—To be Run by an Otto Gas Engine—Price of Gas Reduced—Consolidated—Will They Get a Contract?—The Subscription Books are Open—Annual Election, Jamaica Plain, Mass.—A Tie Vote.
Driving Dynamos with Short Belts..... 109
Notes from the West, by "Retort"..... 110
A Fuel Gas Plant in Pittsburgh, Pa..... 110
The Market for Gas Securities..... 110

[OFFICIAL NOTICE.]

American Gas Light Association.

AUGUST 11, 1887.

To the Members of the American Gas Light Association:

The Fifteenth Annual Meeting of the Association will be held in New York city, on Wednesday, Thursday and Friday, October 19th, 20th and 21st. The convention will be called to order on the morning of the first mentioned day, at ten o'clock. While it is not possible at this early day to give all the details of the meeting, I can, I think, give the members enough information to assure them that those having the meeting in charge are doing what they can to insure its success.

The difficulty of arranging for the accommodation of the members of a convention at a single hotel in New York city during the fall months increases, rather than decreases, year by year, so that it is now found impossible to provide for the care of all the members of the Association in a single hotel. The Committee of Arrangements have, therefore, in deciding on a hotel for the headquarters of the Association, endeavored to secure one which would be adjacent to other hotels, in order that the members might be near together, even if the pleasure of being under one roof were denied them. It has, therefore, been arranged that the headquarters of the Association will be at the Sturtevant House, and accommodation for the members will also be provided at the Coleman and Grand, both of which are adjacent to the headquarters. The Sturtevant is run on the American plan, while the others are maintained on the European system. It will thus be possible for each member to select according to his pleasure the plan upon which he will board during his stay at the convention.

The hall in which the meetings will be held has not yet been positively decided on, but it is hoped that one in the immediate neighborhood of the hotels will be secured.

The banquet will take place at Delmonico's. The price of the tickets I will be able to state at an early date, when I also hope to give more fully the other details of the Convention.

Touching the literary part of the programme, I can only state that we have a nucleus to start with, but that is all. It will be remembered that at the last meeting the Association placed in the hands of the Executive Committee the duty of securing at least five papers to be read next October. The Executive Committee referred this matter to a sub-committee chosen from its own members, which has tried to discharge the obligation imposed upon it. So far, however, the five papers have not been secured. The nucleus mentioned is as follows:

"Fuel Gas," by Emerson McMillin, of Columbus, Ohio.

"Illumination vs. Candle Power," by Alex. C. Humphreys, of Philadelphia, Pa.

"Utilization of Residual Products," by Chas. H. Nettleton, of Birmingham, Conn.

From the above it will be noticed we have only three papers secured thus far, and only a third of the number required to fill out nicely the time at our disposal. I have so often spoken of the responsibility which rests upon each member of the Association, as regards the preparation of papers, that I feel anything I might say now would be but a repetition

of what I have said in former years. I would therefore drop the subject for the present, merely remarking that if the success of the literary portion of the programme of the coming meeting is to depend on three members, they must indeed be giants if they accomplish the task thrust upon them.

If a member has in mind a subject which he thinks it would be to the advantage of the Association to have discussed at the forthcoming Convention, I would be most happy to hear from him.

Respectfully,

C. J. Russell Humphreys,

Secretary.

PROGRESS IN THE MATTER OF THE PROPOSED GAS INSTITUTE.

The plan proposed by Mr. Frederic Egner, at the last meeting of the Western Gas Association, for the formation of an American Gas Institute, seems to have taken a firm hold on the fraternity, and it is quite likely now that the technical portion of the proposition will be indorsed in a practical manner by our gas makers. The Committee of the Western Gas Association on the American Gas Institute have bestirred themselves to some purpose—we suppose it is only fair to say that Committeeman Egner has properly borne the brunt of the labor—and their labor has not been in vain. They have mailed circular inquiries to every gas company in the country, and those who received the circulars have been, as a rule, quite prompt in forwarding replies thereto. Now, it seems to us that such promptness is in itself an indication of the interest that has been awakened in the Egner project; but when we are in position to add that 95 per cent. of the replies received at St. Louis speak unqualifiedly in favor of the establishment of a bureau for investigation and the "spreading of useful knowledge," as per the outlines of the Egner plan, we think the ultimate success of the Institute is assured. Moreover, there seems to exist a perfect willingness on the part of those addressed to bind themselves to furnish the necessary funds wherewith to create and support a real live institution that will be of material benefit and help to them in the practice of their industry. Indeed we must say that the outlook for the establishment of a bureau of investigation is very bright, and confidently look forward to an early fruition of the seed sown under such favorable auspices last spring in St. Louis.

But if the sentiment seems to be unanimous in respect of the establishment of a bureau for the spreading of useful gaseous information, a count of hands in regard to the union for mutual defense, while unanimous also, shows that unanimity to be all against the idea. We opine, however, that such negation was more than expected—in fact that it would be made with force; but we hardly believe that Mr. Egner was prepared for the stern onslaught which has been made against that possible corner stone of the suggested Institute. Humanity is pretty much alike in all respects, and that similarity is strongly marked when it comes to a question of fighting other men's battles. "Laugh, and the world laughs with you," but the world's tear ducts are not at the service of individual mourners. And so it seemingly is with corporations, using the latter word to signify stock companies. Perhaps that is one reason why corporations are said to be soulless, for certainly they have never been known to weep over the discomfiture of one of their kind. Apart, however, from such rambling lingerings after the unknowable, the fact remains that the "union for mutual defense," and for years that idea has been periodically agitated amongst American gas makers (perhaps gas sellers would be nearer to the mark), has been relegated to obscurity by the combined voice of those who eagerly favor a united effort for technical progress.

Possibly some of those who received a copy of the circulars sent out by the Western Association's Special Committee may not, through press of business or otherwise, have responded to the Committee's wish in the matter of forwarding a reply to the questions asked. To those delinquents we would urge an early compliance with the Committee's request for answers to their message, even if an unfavorable response to the entire project must be made by the replier. Those who are so earnestly endeavoring to get at the true sense of the fraternity in respect to the Institute proposition are entitled to ordinary courtesy at the hands of their correspondents, and we feel sure that any remissness on the part of the latter is not to be charged to wilful neglect. Hand in your suffrages in order that the architects may not grope in the dark.

Before taking leave for the present of the subject under comment, we feel that the following extract (taken from an editorial in the London *Journal*, dated July 19) will be read with interest. The writer, in the course of an article headed, "Papers at the Gas Institute and Elsewhere," says: "It has been remarked that the standard of communications for the Gas Institute differs from that of other national societies of the kind; and a little more explanation of the differences may be given here. The papers read at the meetings of the American Gas Light Association come nearest to the British style—as might be expected. Yet the circumstances of gas supply on the two sides of the Atlantic are so essentially different that the technical transactions of the two representative associations cannot be altogether similar. The shadow of competition lies over the professional utterances of our American cousins. They appear in many instances to be men of business—of keen, cutting business—first, and gas engineers afterwards. Many topics, which to Englishmen are of the first importance, are never mentioned at meetings of American gas engineers. The Americans talk well, and often have something good to say; but again and again one is disappointed to find that writers of papers among them are infected with the forced jocularity and trivial verbiage of the ordinary American newspaper reporter. It is very significant of the conditions under which gas supply is conducted in the United States that at the last meeting of the Western Gas Association Mr. Frederic Egner proposed the founding of an American Gas Institute, which organization, instead of being a purely technical body for the cultivation of the science of gas engineering, was to be a 'federation' for mutual protection against 'unfair competition,' and for investigating inventions relating to gas making processes and apparatus. Of course, it is not for us to say that an organization of this character cannot be established, but regard for the meanings of words requires a protest against the misuse of the term, 'Institute' in connection with any such purely pecuniary scheme. It is sufficiently evident that not until the gas industry of America is settled upon a sound basis which shall relieve engineers and managers from daily fears for their means of living, and shall enable them to turn their attention from competitive rates, fighting funds, and other insecure props, to the essentials of gas supply in engineering, administration, and management as understood in the United Kingdom, can we expect the papers of the American gas engineers to approach more closely the best models of such productions."

Our contemporary seldom speaks of American gas affairs in a style similar to the above, and we are at a loss to understand exactly what is meant in the present instance. Perhaps it is best to ask our readers to judge for themselves, and then all may be satisfied, each in his own way, over the inciting cause. Acknowledging the soft impeachment that our home gas engineers are "men of keen, cutting business," we nevertheless submit that we have the temerity to hold them to be gas engineers, first and last. While they cannot and do not lay claim to be looked on as successors to either Addison or Macaulay, nevertheless they are abundantly able, through the papers prepared by them, to express their ideas in a manner easily comprehended by those whom they addrsss. Perhaps Mr. Egner would have been closer to precision did he select some other title than that of "Institute" wherewith to designate his "movement;" but at the formal christening that slight defect may be remedied. Further, from the tenor of the replies so far received the "movement" is quite sure to be removed from the bane that seemingly attaches to a "purely pecuniary scheme."

LEVEY'S ELECTRIC LIGHT PRIMER.

We are in receipt of a copy of a pamphlet which is simply neither more nor less than what is claimed for it by the author—Mr. Chas. L. Levey, of this city—who asserts that it is a "Simple and comprehensive digest of all the important facts connected with the running of the dynamo and electric lights, with precautions for safety, etc., for the use of persons whose duty it is to look after the plant." Knowing that many gas companies are now operating electric lighting stations in connection with their gas plants, we think that Levey's primer has not made an inopportune appearance. It is just the sort of book that an intelligent foreman would appreciate and value. The object of the author in preparing the book is thus tersely stated in the preface: "It is not supposed that these pages will be of any value to the electrician, but the great difficulty of explaining a science in other than technical terms must be accepted as an excuse. The object of the writer has been to reduce a scientific subject to common-place language."

Belated Waifs.—Just prior to going to press we received a most interesting collection of "Western Waifs," for which our correspondent, "Diaphragm," is responsible. Unfortunately the copy hook will have to care for them during the fortnight; but, as good things never spoil, they will make their appearance in our next issue. He introduces his budget by saying: "The gas men of the Buckeye and Hoosier States all speak hopefully of the future, and, without exception, report a decided increase in business this year as compared with that of 1886."

Papers Read at the Recent Meeting of the British Gas Institute.

[In accordance with our usual custom we herewith commence the republication of some of the papers read at the 24th Annual Meeting of the Gas Institute. For our report of same we wish to acknowledge our indebtedness to the London *Journal*.]

Mr. Charles Gandon, of London, read the following paper on

COKE.

The subject of this paper is one that has not often occupied the attention of these meetings, probably because, although the advantageous use and disposal of coke is of importance to gas managers, there does not, at first sight, appear to be much that can be said upon it, as the varying conditions under which it has to be produced do not admit of any general principles being adopted in its treatment. I am afraid also that it will not greatly interest many who are present to-day, as the low cost of coal, in most of the northern and midland districts of England, and the quality of the coke obtained, more particularly where cannel is largely used for gas making, renders coke a question of minor importance, although the difficulty in disposing of it may be consequently increased. In the southern parts of England, however, or where the cost of coal is high, the successful working of a gas undertaking depends in no small degree upon finding good markets for the residual products, and especially for coke. The great fall, during the last year or two, in the value of all residuals produced in gas making, renders it interesting to consider whether means can be devised for increasing the demand for any or all of them. Without being prepared to indicate such means, I am induced to offer these few remarks, hoping thereby to produce a discussion, from which the experience of others may be obtained and some benefit arise.

The recently published reports and accounts of most gas undertakings, both in England and on the Continent, show that the amounts realized for residuals have, almost in all cases, fallen off to a serious extent. This applies perhaps more especially to tar and ammonia; but the value of coke has also decreased considerably in many places, and, in most cases, the latter does not appear to realize its proper value. It is generally assumed that the calorific value of ordinary coke is about equal, weight for weight, to that of coal—that is to say, that a pound of coke will evaporate the same quantity of water as a pound of coal; but if the prices obtained per ton of coke are compared with the cost per ton of coal, it will in most instances be found that the coke has to be disposed of much below its relative calorific value.

By details obtained from a number of gas works in various parts of the kingdom, as to cost per ton of the coal and the prices realized per ton for the coke sold, I find that, during the last half of the year 1885, the prices per ton obtained for the coke varied between 104.4 per cent. and 37.7 per cent. of the cost of the coal per ton; and for the last half of the year 1886 the prices varied in the same way between 118.7 per cent. and 40.3 per cent. of the cost of the coal per ton. In some cases the coke appears to have been sold for even more than the full value; but in many others less than half that value was obtained. These percentages do not seem to indicate that the relative values of the coal and the coke differed to any great extent during the two periods referred to; and the inference might be drawn that the recent reduced amounts realized for the whole of the residuals are not generally due to a fall in the value of coke, but there are instances where large reductions in the prices of coke have occurred during the last six or twelve months. The ever-increasing quantities produced for sale will, no doubt, in some measure account for the lesser value; but there seems reason to suppose that undue competition may also in some cases have contributed to its depreciation.

Coke produced in gas making is principally used for manufacturing and domestic purposes. For some mechanical purposes—such as smelting and for locomotive boilers—it is unsuitable, not being sufficiently dense, and not developing sufficient heat for the furnace space occupied; but for ordinary steam boilers, and for numerous mechanical operations, there seems to be no adequate reason why such coke should not be more extensively employed than it is, provided it is as cheap or cheaper than coal. A larger grate surface is required, so that the full effect cannot be obtained in furnaces intended for coal. But this can be easily supplied in most cases; and the freedom from smoke is one great recommendation for coke. It has been thought to have an injurious effect upon boilers, on account of considerable heat being developed in the vicinity of the furnace; but, by suitably shielding the parts likely to be exposed to such heat, no inconvenient result need arise from this. Numbers of boilers could be referred to which have been worked with coke for many years without suffering greater deterioration than would have occurred if coal had been used; indeed, most gas works would furnish proof of this, as steam boilers in such works are very generally fired with coke or even with breeze. Of course, where space is of importance, either for furnace area or for storage room, as in the cases of locomotives or sea-going steamers, coke may be out of the question; but there are so many instances where it might be advantageously employed that its merits do not seem to be so generally appreciated or understood as they should be.

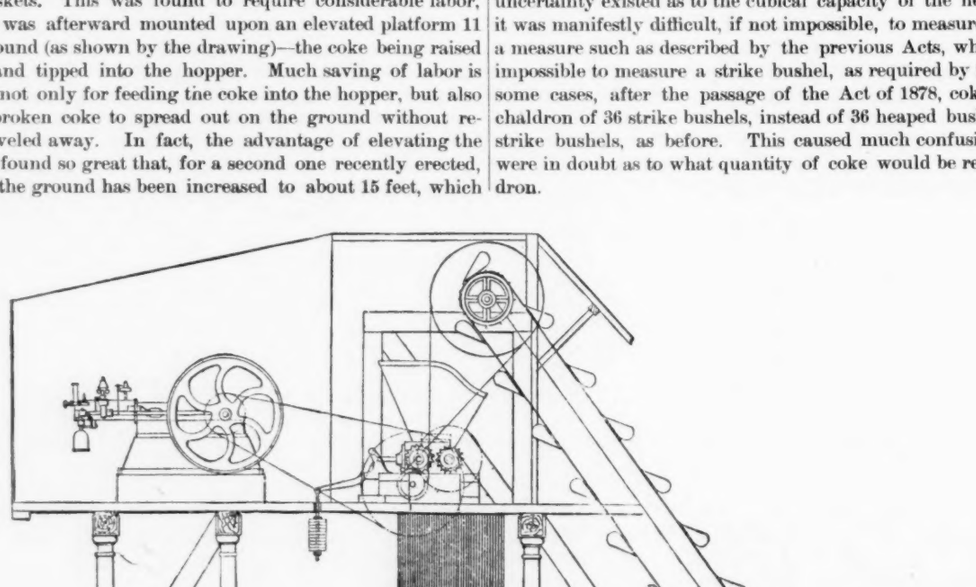
Coke appears also to be quite as little appreciated for domestic purposes. It may generally be purchased at about half the price of coal, and is better and more economical than the latter for many household requirements; yet its use, even by the poorer classes, is rather the exception than the rule. The reason for this has often been asked without being satisfactorily answered; apathy on the part both of buyer and seller may perhaps have something to do with it. We have so long been accustomed to supply our wants with coal that the idea of seeking a cheaper substitute does not occur to many. Coke as usually sold also needs more attention than coal in ordinary grates; and this is frequently considered a drawback to its use, especially by servants. Some time is required, after kindling a coke fire in a common grate, before the full heat is given out; and if the fire is allowed to burn too low before replenishing with fresh coke it is again some time before much heat is obtained. This occurs also with coal, but not to so great an extent; and a coal fire may be stimulated into activity by stirring, while with coke this does harm rather than good. The sluggish kindling of the coke may, however, be remedied, either by replenishing the fire with small quantities at more frequent intervals, or by mixing coal with it; and, if grates are employed in which an increased draught can be temporarily applied when fresh fuel is added, this objection would be still more completely removed.

Closed stoves are so little used in England that it is useless to say much about them; but they possess so many advantages that they should be more in demand, especially for warming halls, passages, and staircases. There is perhaps no country in the world where the houses are so defectively and so extravagantly warmed as in England, owing to no attempt being made to heat the air before it enters the apartments. There are numerous good slow-combustion stoves which, with a small consumption of coke, and with very little care, would remedy this, if fixed in entrance halls or other suitable positions; but any provision for this is rather the exception than the rule in English houses, although of late years gas stoves are becoming more in favor for such purposes. While encouraging the use of these, however, the sale of coke might be considerably increased if attention could be more generally drawn to the advantages of closed stoves for similar purposes. Wasteful as is our system of open coal fires, I am too great an admirer of their cheerful effect in our dull winter climate, and of the assistance they afford for ventilation, to advocate the general substitution of closed stoves in our dwelling-rooms. But I do think that the effect of the latter might be improved, and increased comfort and economy obtained, if they were supplemented by some means of warming the air before it enters the apartments; and I believe that no better or cheaper way can be found for doing this than by the use of closed stoves fired with coke.

Another objection to the use of coke is that, as produced in gas making, the pieces are generally so large that they will not burn freely in an open fireplace. To remedy this it is now in many gas works being broken by hand or by machinery to more convenient sizes, which, to a great extent, overcomes the difficulty before referred to, of its being troublesome to burn in ordinary grates; and I feel so convinced that, by this means, the demand for coke may be materially augmented that I would strongly urge all gas managers to try it, if they have not already done so. At the Crystal Palace District Gas Company's works coke has been sold so broken for several years, and much advantage obtained thereby. The district in question is practically a residential one, there being but few manufactories or other places where large coke could be used. During the last half of the year 1886 nearly 40 per cent. of the coke sold in the district was broken; and the greater part so sold would probably not have been disposed of at all if it had not been broken. The price charged for broken coke is 1d. per cwt. above the cost for the ordinary coke; and I believe that double the extra charge could be easily obtained. The labor for breaking costs 10d. per ton; and 10d. per ton is about sufficient for the cost of working the gas engine and for sundries. More breeze is necessarily produced, but this does not amount to more than 1 cwt. of breeze per ton of broken coke. Where the selling price of coke is high, the additional 1d. per cwt. may not be quite enough to cover the whole cost; but even if a small loss arises from the breaking, there may still be an advantage if the general price of the coke sold can be maintained higher. This broken coke is particularly adapted for use in

kitcheners or closed stoves, being much more economical than coal, and causing no choking of the flues by soot.

An illustration (see cut) is on the wall of a coke breaker which has been in use for several years at the Crystal Palace District Gas works, and has been found very efficient. The breaking portion consists of a hopper, at the bottom of which are fixed two horizontal shafts, having 12 serrated ¼-inch steel disks mounted upon each, with distance pieces between each disk. These shafts rotate toward each other by means of gearing, and draw the coke down from the hopper, cutting or breaking it in its passage. The distance apart of the disk shafts can be varied by weighted levers attached to the two movable bearings of one shaft, so as to break the coke to any size needed. This breaker, when first used, was raised only a few feet from the ground, and the coke was thrown into the hopper by baskets. This was found to require considerable labor, and the breaker was afterward mounted upon an elevated platform 11 feet above the ground (as shown by the drawing)—the coke being raised by an elevator and tipped into the hopper. Much saving of labor is effected by this, not only for feeding the coke into the hopper, but also by enabling the broken coke to spread out on the ground without requiring to be shoveled away. In fact, the advantage of elevating the breaker has been found so great that, for a second one recently erected, the height above the ground has been increased to about 15 feet, which



Coke Breaker in Use at the Works of the Crystal Palace District Gas Company, London.

will admit of the accumulation of larger heaps of broken coke without labor. The coke as it leaves the breaker falls down inclined screens for the separation of the breeze. This breaker, as described, and including the elevator, is worked by a 2½-horse power engine, and 8 to 10 tons of coke can be broken with it per hour. But the engine is scarcely powerful enough to work the breaker and elevator up to their full capacity, and it is proposed to replace it by one of 3½-horse power. The broken coke is, of course, variable in size; but for most purposes this is not found an inconvenience, provided the largest pieces do not much exceed 2 inches cube.

At the Paris gas works broken coke has been supplied for many years, and it is there divided into three or four sizes by means of a revolving cylindrical screen, with meshes of different sizes—varying prices being charged according to the size required. This plan has many advantages, especially where, as in Paris, coke is so generally used for many purposes. But the cost of breaking is thereby increased, more breeze is produced, and the sale is complicated; so that, until a good demand for variable sizes can be anticipated, it may perhaps be sufficient, in the first place, to familiarize English consumers with the use of the coke as it leaves the breakers simply freed from breeze.

The breaker used at Sydenham has been found to answer exceedingly well; but there is no reason to say that it is better than several others that can be obtained. Messrs. Thomas and Somerville have introduced one, which is being largely adopted, especially as a hand-breaking machine for small works; and some years since I saw a very excellent coke breaker at the York gas works, made by Messrs. Smith, Beacock and Tannett, of Leeds, and which was described in a paper read by Mr. Sellers in 1879 before the then British Association of Gas Managers.

Another point in the disposal of coke is the consideration whether selling by weight or by measure is preferable. In the north of England sale by weight is probably more general; but in the south, and especially in the neighborhood of London, or in what are termed the "Home Counties," measure is in many places the rule. Before the Weights and Measures Act of 1878 became law, the general practice in selling by measure was to reckon the chaldron equal to 36 heaped bushels; some uncertainty existed as to the cubical capacity of the heaped bushel, and it was manifestly difficult, if not impossible, to measure coke heaped in a measure such as described by the previous Acts, while it was equally impossible to measure a strike bushel, as required by the new Act. In some cases, after the passage of the Act of 1878, coke was sold by the chaldron of 36 strike bushels, instead of 36 heaped bushels, or about 48 strike bushels, as before. This caused much confusion, as purchasers were in doubt as to what quantity of coke would be received for a chaldron.

A further difficulty in selling by measure is that, if the coke has to be sent any distance, it will decrease materially in bulk by shaking together and the breakage of the pieces—giving rise to complaints that the proper quantity is not being received, although good measure may have been given when loading it.

Shortly after the passage of the Act of 1878 a meeting of the members of the Southern District Association of Gas Engineers and Managers was held in London, to consider the desirability or otherwise of selling by weight; and although some members then present were in favor of measure, it appeared that the more general preference was for weight. At that meeting I was an advocate for measurement. Further experience, however, caused me to arrive at the opposite conclusion, and since July, 1884, coke has been sold at the Crystal Palace District gas works by weight. The change appears to have given general satisfaction to purchasers, as complaints as to quantity delivered are now very rare; whereas, when selling by measure, they were more frequent. Selling by weight involves somewhat more labor, and there is a difficulty as to the increased quantity of water the coke may hold in wet weather. If sold soon after being drawn from the retorts, this question of water is of very small importance; but if the coke is stored in the open for any considerable time there is no doubt a large increase in weight in wet weather—amounting, as I have at times found, to from 15 to 20 per cent. This is, however, only on occasions when large stocks have accumulated.

The regulation of the selling price of coke, so as to dispose of it to the best advantage, is a point requiring much consideration, and one upon which there necessarily exists considerable difference of opinion; but I think it may be broadly assumed that it should be disposed of as soon as possible after being produced, as the quality and quantity both deteriorate by keeping, and expense is in most cases incurred for stacking. There is, of course, in some instances, a largely increased demand for coke at certain seasons, which may necessitate the accumulation of a stock; but as a rule the manager who can dispose of his coke as it is made is in a fortunate position. The demand must necessarily vary with the localities. In manufacturing districts all the coke produced can, as a rule, be sold within the area of the gas supply, without there being so much need to cultivate a demand for it for domestic use. But in residential districts this is frequently not the case; and it is often impossible to get rid of all the coke without sending it considerable distances, and probably coming into competition with the produce of other gas works. Much prejudice is sometimes caused by this; and it has been urged that one gas undertaking ought not so to compete with another. It cannot, however, be always avoided, as, if not directly done by the gas management, it will be by dealers, if the differences of price are sufficient. Coke is at times sold to distant consumers at largely reduced rates, in order to keep up the price in the locality where it is produced; but the policy of this appears to me to be very questionable. It is doubtful whether so good an average price is thereby obtained; and it seems desirable to give the gas consumers of the district where the gas is made the benefit of the lowest prices. Instances could be given where gas companies at great distances apart have been simultaneously sending coke into each other's districts, and thus evidently selling at lower prices, by at least the cost of the carriage, than would have been obtained if each company had kept within its own area. I believe the best policy will be found to have one uniform selling price, or, at the most, only small variations therefrom, and to so regulate this selling price that the accumulation of a large stock is avoided. At all events, it seems to me to be wrong in principle to make large reductions to purchasers at a distance, which is, as a general rule, unnecessary and prejudicial to all concerned, except perhaps to the carriers.

Most gas managers are more or less troubled with the disposal of breeze. One drawback to the sale of broken coke is that the amount of breeze is augmented; and it is the more necessary to consider whether any means can be found for getting rid of it. The increased quantity will not, I think, be found in most cases to be a very serious obstacle, as it does not exceed 1 cwt. per ton of broken coke sold; and if this is paid for by the extra price charged, the resulting breeze is so much to the good, unless indeed payment has to be made for its removal. I think, however, that the various purposes to which breeze may be applied are not in general sufficiently well appreciated. I can remember the time when the whole of the breeze could be disposed of at fair prices—being in demand for ballast burning, road making, and other purposes; but at the present time, with increasing production of breeze, and a partial cessation of building in our locality, there is an undoubted tendency for the breeze heap to extend in size.

The idea of forming breeze mixed with tar into a compressed fuel is by no means new; but this does not appear to be done in England to any extent, probably because of the difficulty of making such fuel without the admixture of so much tar that too much smoke is given off in burning. The Paris Gas Company has adopted this plan for many years, and has large and powerful machinery for manufacturing compressed blocks with tar and breeze, which is probably successful, because very great hydraulic pressure is employed, and the quantity of tar required is thereby considerably reduced. Many years since Mr. George Anderson also introduced a machine for making tar and breeze fuel, samples of which I have seen; but they appeared to contain too much tar, probably because sufficient pressure could not be employed. It would, however, be interesting to know if this machine is still used, and, if so, with what results.

A mixture of tar and breeze also makes an excellent footpath, not perhaps quite so durable as where gravel can be obtained; but, where the latter is expensive, breeze is a very good substitute. We have footpaths at the Crystal Palace District gas works made in this manner, which, to my knowledge, have been in use for over ten years, and are still in good condition. In laying such paths the great point, as in the preparation of tar fuel, is only to employ sufficient tar to effect the binding of the breeze; and this can be best accomplished by using a plentiful supply of water when mixing the tar, which is thereby effectually distributed through the whole of the breeze, while this can only be imperfectly done if the tar and breeze are mixed alone. A mixture of 24 gallons of tar per yard of breeze will make an excellent footpath if prepared in this way.

Fine breeze is also a good substitute for sand for mortar, even if simply mixed by hand, as is usual with sand; but the quality of the mortar is much improved by being ground in a mill, although this is also the case with sand. Such coal ash mortar is objectionable for some purposes on account of its dark color; but for inside work this is of no consequence, and for exteriors it may be obviated by pointing with sand mortar, if necessary.

At the Crystal Palace District gas works large quantities of concrete have also been used composed of breeze and clinkers, with lime or cement. We have there a tar and liquor tank of 400,000 gallons capacity, constructed entirely, including the arched top, of concrete made of these materials. The ground, however, in which the tank is built is a stiff clay, quite water-tight in itself, so that the chief duty of the tank walls is to hold up the ground; but we have other tanks above ground, built in the same manner, which have been made water-tight with cement rendering. Concrete composed of 10 to 12 parts of breeze to 1 part of cement would certainly be quite porous; but where the ground itself will not hold water there would be no difficulty in forming a water-tight tank with such concrete, either by clay puddle externally or with cement rendering internally. The foundations of all retort houses and other buildings, and for all apparatus at Sydenham, have for many years been formed of breeze concrete, the extensive use of which for such purposes has prevented the accumulation of breeze to any inconvenient extent.

Perret's breeze furnace, which has been introduced in England by Messrs. Bryan Donkin & Co., may also be mentioned as another means for utilizing this material which appears to merit more attention than it has yet received. This furnace can be fitted to any ordinary steam boiler, and consists mainly of thin deep fire bars placed closely together, the bottom edges of the bars being immersed in a trough of water in the ashpit, and the ashpit being closed. The breeze is spread upon the bars in thin layers, and a forced draught is blown through it from the closed ashpit by a fan or injector. I have had some experience of this furnace, and find it will burn the finest breeze; and the bars, being kept cool by dipping into water and from the air being forced between them, are not readily destroyed. Some inconvenience occurs from the fine fuel being carried by the draught into the flues; but with care not to work the air at too much pressure, and with suitable arrangements for readily clearing the flues, no great trouble arises from this. Weight for weight, more breeze is required than when coke or coal is used; but, with the relatively small value of the breeze, it is considerably cheaper.*

With sufficiently large retort furnaces and suitable means for the admission of air, breeze may also be consumed in these furnaces. At Sydenham this has been done to some extent, both with ordinary furnaces and in conjunction with tar. Furnaces have also been recently constructed in which it is hoped to work entirely with breeze; but as these have not yet been used, I cannot speak of their success.

I must apologize for having occupied so much time with these remarks; but, having experienced the heavy depreciation in the value of residuals, I am perhaps inclined to attach more importance to the subject than it deserves. If the few suggestions I have endeavored to make induce other members to give their views to the meeting, the time I have taken up will not have been altogether wasted.

Mr. Gandon was followed by Mr. C. E. Jones, of Chesterfield, who read the following paper, entitled—

GAS COKE AS A GENERAL FUEL.

It may be as well to indicate at the outset that one of the primary objects of this paper is to provoke discussion; its author being convinced that more technical advantage is secured by the collective experience of many than the isolated experience of one individual, however desirous or competent he may be to impart information to his professional brethren—a qualification not claimed by the writer of this paper. Frequent comparing of notes is of considerable benefit to all persons engaged in the same or similar paths of industry. Hence the author has been induced to introduce the question of gas coke in the hope of eliciting from those in a more favorable position than himself information respecting its manifold applications, and the means adopted for its disposal and extended uses. The question of the consumption of coke in gas works involves many points which may be advantageously discussed by the meeting; but it is by no means desired to confine observation to what takes place in a retort furnace. Rather is it sought to deal with coke from the point of view of the consumer; and by teaching such how to employ the

* Messrs. B. Donkin & Co. state that the number of pounds of water evaporated per pound of fuel is as follows:

With breeze or dust gas coke as burnt on Perret's grate	5¼ lbs. water.
With dust Welsh coal as burnt on Perret's grate	8½ " "
With ordinary Welsh coal on ordinary grate	9 " "
With large gas coke burnt on ordinary grate	7⅛ " "

fuel to the best advantage, augment the area of absorption to the benefit of gas undertakings and the community generally.

While attempts are being made to introduce smokeless coal into large towns for domestic consumption, it may not be out of place to examine the claims of gas coke to be considered one of the chief agents at command for purposes where a smokeless solid fuel is required. Were we called upon to manufacture a superior solid smokeless fuel to supersede bituminous coal, in all probability we should have produced a similar if not the identical article known as gas coke, since it certainly possesses in an eminent degree the qualifications of such a fuel. By the aid of geological research it would be easy to show that the cosmogonies of our most ancient systems are unreliable as to the date of man's advent on the earth, and of his knowledge of coal and the practical uses to which primitive humanity applied the "black diamond." It is certain that coal was used in the "flint age," since an ax and other tools of this description and siliceous material have been found in disused coal measures where it was evident they had been employed in "winning coal." Many instances might be advanced connecting what we are pleased to call "primitive" man with coal. But it would be equally easy to demonstrate, on purely historical and logical grounds, that the present method of burning coal in an open grate with an exit for the smoke in the roof is, despite the proud boast of the march of civilization, as primitive, barbarous and wasteful as that adopted by the ancient Britons ages before the Roman invasion of Britain. In the last year of the reign of King Edward I., in consequence of the smoke created by "Sea-cole," as it was called, on account of its being sea-borne, its use was prohibited by royal proclamation (1273). The restriction was removed in the succeeding reign; and from that time till the present the "smoke nuisance" has been tolerated with lamentable results. The atmospheric condition of large towns is injurious to health and a deadly foe to longevity, solely due to the use of bituminous fuel. Were smokeless fuel employed the atmosphere would be entirely free from the infliction of smoky fogs. Sanitarians have overlooked the fact that gas coke is the panacea for the evils complained of. The remedy of King Edward might have proved worse than the disease; but it is nevertheless a fact that for 600 years the minds of men have been exercised to devise means to abolish the smoke nuisance, while here is offered a perfect cure, inexpensive and effective, and not even requiring the protection of a "patent." Smokeless fuels abound on all sides of us, and appear to be neglected. History is said to repeat itself; and it is remarkable that a return to the smoke legislation of Edward I. has been proposed in this year of Jubilee. Edward I., it might be observed, succeeded a King who rejoiced in a Royal Jubilee. How complete would be the parallel should the successor to Her Majesty Queen Victoria re-enact laws forbidding the use of bituminous coal.

Taking the volatile constituents of a ton of bituminous (Derbyshire) gas coal at 870 pounds, we have 1,370 pounds of coke, or, say, 61.16 per cent. of solid residue, and 38.84 of volatile and liquid products. The latter percentage represents a factor of the highest importance to the gas manufacturer. The former is not nearly so valuable. Why is this? The author believes that the answer is to be found in the indifference with which the general public regard the question of atmospheric pollution, and their want of knowledge of the excellent qualifications of gas coke as a smokeless fuel. It answers every purpose required of it when employed in domestic purposes. Its advantages over coal are manifold, as will be considered later on. Theoretically the extraction of the hydrocarbons or smoke-making constituents preparatory to employing the fuel in an open grate harmonizes perfectly with scientific teaching. It is perfect and solves the problem of smoky chimneys and atmospheric pollution completely. With this truism before us it is singular that gas coke commodity of comparatively low value. The present affords an excellent opportunity for endeavoring to advance the article in public estimation, not only by entering into competition with King Coal in the domestic arena, but in manufacturing circles as well. It is a mistake to suppose that coke will not burn well in ordinary open grates. It has been objected that the use of coke would entail enormous expense on property owners by necessitating structural alterations in dwelling houses. This is not so when the fuel is broken to suit the size of the grate. Nearly all grates will burn coke more advantageously than coal. The latter is broken to suit the grate; why not coke? Again, it is said a strong draught is needed to keep up combustion. This is also fallacious. The whole question, it appears to the writer, turns upon the size of the fuel as adapted to the form of the grate. Some fireplaces require coke the size of hazel nuts; others burn 2-inch cubes and upwards without difficulty. When the most suitable size of the coke has once been ascertained, no trouble is afterwards experienced.

One cause of the popularity of bituminous coal in households is its kindling properties. Coke fires can be started without coal; but where time is important a few pieces of coal will assist the operation. Coal, when burning, cakes, and requires the use of the poker; coke falls together as it burns away, and requires but little attention. Coal burns with much smoke and flickering flame; coke, on the contrary, burns with a cheerful glow, with an absence of flame or smoke, and is far cheaper, dispensing as it does with the domestic evils known as "sweeps," with all the concomitant horrors attending their operations. Chimney sweeping alone is an important item in household economy, usually amounting, where coal is used, to 1s. and upwards per chimney per annum; but some chimneys and flues require cleansing three or four times a year, thus trebling or quadrupling the estimated cost. By using smokeless fuel this expense is entirely saved, besides the enjoyment of immunity from conflagrations, or the risk of being burnt out by means of chimneys taking fire. Should the next race of architects discard the open grate, and adopt the more scientific mode of heating dwellings and other buildings by hot water, no better fuel than coke is at present in the market, regard being had to its selling price. The use of coke increases the sum of domestic comfort and happiness, encourages longevity, promotes the purity of the air, and confers hygienic blessedness on suffering humanity. Bituminous coal does not, from the very nature of its composition, possess the above attributes; but when used in open grates, brings many evils in its train, with which, unfortunately, humanity is too familiar. This is no "fairy fable" or matter of conjecture, but clear to demonstration. It is not theory, but practice. For years gas coke has been employed in open grates and kitchen ranges in the domestic economy of the author, to the exclusion of coal, which is only tolerated for kindling purposes, or when mixed with inferior coke for greenhouse fires. In the offices of the Chesterfield Water Works and Gas Light Company, the same class of fuel is used with satisfactory results, coal being prohibited. Let other gas managers pursue the excellent practice of preaching by example and not precept alone, and gas coke will soon be established as a popular household fuel. After domestics become accustomed to its use it is preferred to bituminous coal. Experience abundantly justifies these observations.

Any steam user desirous of exercising economy in raising steam would do well to study the calorific value of fuels. Especially would he be benefited by a reference to the experience of Mr. Henry Hack, at the Saltley Gas Works, Birmingham, which that gentleman detailed in his able inaugural address to the Midland Association of Gas Managers last February. There he will find that the cost of evaporating water is largely in favor of coke as against "slack." But on theoretical grounds it can be shown that for steam purposes a porous fuel like coke is much superior to "slack" or colliery refuse, which contains, weight for weight, a large preponderance of mineral or foreign matter. Let any person employing steam daily make an honest test with coke, either in combination or without "slack;" and it is not too much to say that he will certainly decide in favor of coke. Perfect combustion cannot be secured with coal, on account of the interior of the mass being subjected to the process of destructive distillation. Coke offers many advantages in this respect over coal. When it is remembered that the quantity of carbon present in an average sample of gas coke is over 88 per cent., and that anthracite coal contains very little more—usually about 2¼ per cent.—it will be readily conceded that we have a fuel under consideration of a very high order, evolving a heat duty of over 12,000 units per pound; pure carbon yielding, when burnt into CO_2 (carbonic acid), 14,5000 units of heat only.

Gas coke is applied on a small scale to so many purposes that a mere enumeration of them would be tedious. It even competes with oven coke in small foundries, and some brass founders use it exclusively. It is also well adapted for forging purposes of nearly all classes, when care is taken to insure the correct size for the purpose required. The size needed by blacksmiths is a most important consideration. Blacksmiths engaged in light work require the hearth fuel much smaller than others forging heavy work. It is obvious that the man who makes an ax requires larger fuel than one who forges a penknife. Cleanliness in screening the coke is essential, and for steel forging, especialy in cutlery, a coke yielding much sulphur in the ash is unsuitable for this purpose. If it be known that the coke is "sulphury" it is better not to recommend it for blacksmiths' use. The practice of the author has been to supply coke for manufacturing purposes as small as horsebeans, and as large as will pass through a 1¼-inch circular ring, or thereabouts. Walnut size is perhaps in greater demand, and suits coach smiths, shoeing smiths, and general all-round work. As a rule, preference is given to uniform-sized coke—that is, without much variation from the given size. The disposition of gas coke to break up cubiform rather than laminar enables this requirement to be easily satisfied. From observation it appears that the quantity of coke used for domestic purposes during the summer

months is but one-fifth of that used in the winter quarter. That used for manufacturing purposes, allowing for the variation and vicissitudes of trade and commerce, may be taken as a constant all the year round.

In malting districts coke is found to be an excellent fuel for drying malt. Here, again, it may be desirable to observe that it must be well "burnt off," and contain a minimum of sulphur. If a large proportion of sulphur be present it spoils the quality of the malt. The finest coke screenings are utilized for burning lime and cement; and the ashes mixed with tar make good asphalt walks. Attempts are being made to convert coke dust, "slack" and tar into briquettes. It requires a little pitch also to bind the materials together; and when made small the briquettes will burn in open grates. So far, however, as the author's experience extends coke for open grates is infinitely superior to briquettes. The advantages of using coke for heating public buildings—such as churches, schools, workhouses, and other institutions now warmed by hot water apparatus or hot air—does not appear to be sufficiently appreciated; and much may be done by gas managers in their respective localities in making known its qualifications to the public advantage. For greenhouses or hothouses coke is well adapted, either alone or mixed with a little small coal. When fires are left to take care of themselves for nine or ten consecutive hours a little slack or small coal will keep the fire in more safely than coke alone, unless the grate or furnace be a large one, when coke fires answer admirably.

The author has very little to say on the subject of coke crushing machinery, which is generally delicate ground. A very simple roller machine of his own adaptation is found, by the crucial test of experience, to be efficient. It is driven by a portable engine, and, when fully fed, can crush and screen a ton of coke in four minutes. Other machines may do better; but probably it will be considered that this is not bad work. The screened material passes direct into railway trucks, and is ready when loaded for despatch. A vault under the crusher receives the dust falling from the screen. The bare cost of crushing, without interest on plant, works out to 1.73d. per ton during the time the machine is at work.

In works where coke is realizing good value the author would advise the manager to be thankful for his surroundings, and not put down coke crushing machinery, unless perfectly satisfied that an increased return will be the result. Where coke, however, is a drug in the market, even in the colliery districts, crushing it will nearly double its selling price. Much will depend on local circumstances; but, speaking generally, from a knowledge of several works where formerly coke in its large state was unsaleable at a few shillings per ton, reducing its size has increased its value, and enables that value to be maintained during the depression of trade. While the liquid products have suffered such an alarming fall in prices, the residual coke has in all cases remained firm, and in some instances increased in value, notwithstanding, as aforesaid, the prolonged depression in our national prosperity.

The experiences of other managers using bituminous coal will add to the interest attaching to this question. On account of its peculiar nature cannel coke has been omitted from consideration on this occasion; but any experience gained by managers using the better varieties will not be out of place, but fraught with practical value, while a broadcast dissemination of the virtues of gas coke from bituminous coal cannot fail to be productive of beneficial consequences to all interested in the question, be he a scientist, a disciple of Hygeia, a gas manager, or *Paterfamilias* himself.

Discussion.

Mr. H. Hack (Birmingham) said that all must admit the importance of the matter touched upon in these two papers. He would ask Mr. Gandon if he was quite sure of the accuracy of his information about coke being unsuitable for locomotives. He was under the impression that the London and Northwestern and the Midland Railway Companies used coke very largely in their locomotives. In Birmingham they employed it for the locomotives at the gas works, and found it to answer exceedingly well—indeed, better than coal, as it did not stop up the flues so much. Mr. Gandon said that no general principles could be adopted applicable to all places; and all would agree with this statement. Upon one matter, however, he thought all would equally agree, and that was that it did not pay to stack coke in large quantities; that, all things considered, it was advisable to get rid of the coke at such prices as it would fetch, as it was made—for while they were doing all they could to please their customers by breaking coke, etc. (following the plan which had been adopted for many years on the Continent), by stacking it in large quantities they would be undoing much of the good that had been accomplished, because coke deteriorated if stacked for a long time, and if a customer became once dissatisfied through being supplied with old coke, it was a difficult matter to get him to try it again. There could be no doubt that broken coke was a very suitable fuel for domestic purposes. A short time ago he made some experiments in his own offices in regard to it, trying some of the best gas coal, then broken coke with coal, broken coke with slack, and broken coke by itself, each for 48 hours; thermometers being hung in different parts of the room and on the wall outside the building, and the temperature taken hourly night and day. Taking the difference of temperatures, quantity of fuel used, and all other things into account, the broken coke came out considerably the best.

Mr. W. Sugg (London) said it became his duty some years ago to make inquiries into this question, and, being in Paris, he ascertained what had been accomplished by the Paris Gas Company, who, he believed, had done more than anyone to popularize the burning of coke. The sale for coke there was so large that they had to pile it up in the summer, or they would be unable to supply the large demand in the winter. The principal thing they did at the outset was to study the methods of burning coke in private apartments. They found there were two or three kinds of stoves generally used in Paris, but the one chiefly employed was called the "Prussien," which resembled an English fireplace with the stove taken out, and a shutter in front, which could be lowered to the ground. Inside was a basket in which could be burned either coke or anything else. This answered very well for coke, because when the fire got low the shutter could be lowered, which made a rapid draught underneath, and the coke burnt up. The Paris Gas Company also produced several models of fireplaces, which were still used very satisfactorily; the key to the whole question being the necessity for securing a rapid draught when required. When there was not a blower to pull down the Paris Gas Company used a gauze shutter in front of the fire, so that there was always a draught going in over the front of the fire, and preventing the escape of sulphurous fumes into the room. By such means coke could always be burned well in private apartments, with less of the disagreeable dust which coke burned in an ordinary fireplace generally distributed all over the room, and which was very destructive to furniture. By having this gauze cover over the fire no dust could fall except that which fell to the bottom of the grate, and this could easily be prevented from coming into the room. He had tried coke in his own fireplaces, but he found that, as they were not constructed to burn even coal very well (for in certain positions of the wind the smoke came down the chimney instead of going up), when coke was introduced it was absolutely unbearable. There was no possibility of meeting this difficulty with ordinary fireplaces, and that was a great drawback to the use of coke. But even this might be overcome by the use of a blower, or one of the gauze screens he had described. The main cause of a down-draught was that the chimney throat was too wide, and sometimes it was too large all the way up. In some cases, however, this could be remedied by reducing the aperture at the top, thus preventing the down-draught and the escape of sulphur into the room. Where coke could be sold for domestic purposes—and this brought the best price—it was desirable to ascertain the kind of stoves in use, and then apply some such simple remedy as he had indicated, so that the consumers might be able to use coke advantageously. There was no doubt coke was best for kitcheners, because it kept the flues clear; but for this purpose it must be broken small. If this were done servants would prefer it.

Mr. W. H. Broadberry (Tottenham) said that he had to deal, like Mr. Gandon, with a residential district. At one time they sent the greater portion of their coke away to a distance; but, unfortunately, the representative of a large gas company in the neighborhood found out who was the customer, and business in that quarter dropped off, so that he had to see what he could do to dispose of it for domestic purposes. He commenced breaking the coke by hand, charging an extra price for it; and in the first year he managed to sell about 500 chaldrons in the broken condition. Then he introduced a machine, and the sale increased the next year to 1,200 chaldrons, and the following to 2,800; and he had no doubt it would go on increasing. At first they made a considerable quantity of breeze; but the amount made by the machine was nothing at all in comparison to that made by hand. They had also discovered accidentally that when broken up warm scarcely any breeze at all was made; it did not amount to more than 1½ bushels per ton. They first sold the coke by measure; but breaking it up necessitated selling by weight, and they had experienced no difficulty in making the change. With regard to keeping up the price, they found that doing so only benefited the coke merchant; and therefore they had lowered it at the works, and this, in conjunction with the breaking, was the main cause of the improved demand.

Mr. Lewis (Wellingborough) asked Mr. Gandon whether he included the dust made by the coke breaker in the amount of breeze per ton, which he gave as 1 cwt.; and also whether he experienced any difficulty in disposing of it. He (Mr. Lewis) had at times some trouble in getting

rid of the dust. They had tried it for asphalting purposes, but people found other material cheaper, because the dust absorbed so large a quantity of tar. They had been breaking coke for about eight years, and had now succeeded in selling 50 per cent. of their make in a broken state. As to the breeze from the coke itself, they used it entirely under the boilers for raising steam. They broke the coke into different sizes for kitcheners and for blacksmiths' purposes. In the winter the latter kind rather accumulated, but it always went off in the summer. He thoroughly endorsed the opinion expressed in both papers as to the wisdom of breaking coke, and thus increasing its sale. He thought it would be wise of every manager to do this; and even those who were well situated at present for getting rid of their coke would materially assist consumers if they were to break it, as it was not altogether a question of £ s. d., but of meeting the customer's requirements in a proper manner, and thus, to a great extent, creating a further demand for coke for domestic and other purposes.

Mr. G. Anderson (London) said the manufacture of breeze into fuel had always been with him purely a commercial question. They had a lot of breeze at a certain gas works for which they formerly got 3s. a ton from the brickmakers; but the price went down by degrees until they were only offered 1s. He then told the manager not to sell it at this price; and as the brickmakers would not give more, he introduced a machine for mixing it with tar, using about 40 gallons to 1 ton of breeze. This did not produce a smoky fuel; on the contrary, it required some stirring to make it burn. It did not fall to pieces, but retained its shape. When the brickmakers saw what they were doing they bought the breeze at the old price. He therefore stopped the machine, because they had a bad sale for coke, and he did not want to make coke artificially. It was simply a commercial question with him, and he should not have introduced the machine at all if he could have sold the breeze.

Mr. Wilkinson (Harrogate) said his was a purely residential neighborhood, and for many years they had had an annual accumulation of coke, amounting sometimes to 900 or 1,000 tons. They used a good caking coal, containing very little sulphur; and from the coke produced, after firing the furnaces, they had something like 12 cwt. per ton of coal carbonized for actual sale, which realized about 11s. 6d. per ton. By the use of a coke breaker the whole was now readily disposed of. They utilized the breeze and also their clinkers for making asphalt, which was sold for making paths. They also used the breeze, mixed with lime, for building purposes, putting in about a quart of tar to each pug-mill panful, and intimately mixing. This made a mortar which was almost as good as cement. If a cartload were made on Saturday, it would take a pickax to separate it on Monday. The small coke breeze, when all which could be otherwise utilized had been picked out of it, was spread over the coal before putting it in the retort; so that they got it back again in the shape of coke, and without at all deteriorating the sample of coke or gas. With reference to the calorific value of coke, he might say that they had to use road steamers and wagons to fetch their coal; and during the Jubilee celebration they volunteered to take about 500 children in their coal wagons in the procession. The train consisted of one 8-horse power road engine and five large wagons gaily decorated. They only used broken coke for firing, had neither smoke nor dust, and took a load of 40 or 50 tons very easily up some steep gradients—as much as 1 in 13. The pressure in the boiler was easily maintained at from 150 to 160 lbs. when required.

Mr. F. D. Marshall (Copenhagen) said he had about a dozen coke crushers, and his difficulty was to get a material which would stand the wear and tear. He had tried teeth on rollers, toothed rollers, plain rollers, cast iron, wrought iron and malleable iron; but until lately had never been able to get a tooth which would stand the heavy work. After about a week the rollers failed and the teeth had to be replaced. Recently he had obtained some Swedish cast iron, which seemed absolutely indestructible. It had been in use now for three or four months, and showed no signs of wear. This was a very important matter, as the cost of a set of teeth was from £1 to £2. He should like to know what material Mr. Gandon used.

Mr. Fish (London) was about to refer to some of the historical points brought out in Mr. Jones' paper, when

The President suggested that, though ancient history was very interesting, the time at the disposal of the meeting would hardly allow of their going so far back.

Mr. Gandon (Sydenham) said he had noticed one or two points in which Mr. Jones did not quite agree with him—for example, in the cost of crushing, which Mr. Jones put at 1.73d., whereas he gave it at 10d. per ton; and naturally people might think the evidence conflicting. All he could say was that he had his coke broken by contract, and that was what he paid; and the contractors were not getting very rich upon it. Whether Mr. Jones had a superior machine, or a superior kind of laborer, he did not know. Then Mr. Jones said that where the coke realized a good price he would not recommend it being broken; but he (Mr. Gandon) could not agree with that. Where they obtained a good price for unbroken coke they might get a still better price for broken; at any rate it was worth trying. Mr. Jones also said that while the liquid products had suffered great depression, coke had remained firm, and in some cases had increased in value. This was true; but many could bear testimony that in other instances it had declined. When he spoke of the use of coke in locomotives he referred only to gas coke, and that was not an absolute rule, because they had a small locomotive at his works in which they employed coke. So far as he knew, however, railway engines used a specially-made coke; he had never known them to burn gas coke for long journeys or heavy loads. Mr. Sugg's remarks were very useful as to the necessity of producing a quick draught when fresh coke was put on in domestic fireplaces. In answer to Mr. Lewis' question he would say that the breaking caused 1 cwt. of breeze, besides what there would be were the coke sold unbroken. With regard to the crusher teeth, he used discs, ¼-inch thick, mounted on a shaft with distance pieces between them, and the discs could be taken off and new ones fixed. He agreed with Mr. Marshall as to this difficulty; in fact it was the only difficulty he had with the breaker. If Mr. Marshall had some material which did not wear out he should feel very grateful for some samples. He had tried wrought iron, cast iron, Swedish iron and steel; but the cheapest he had found, which were at all good, were made of malleable cast steel, costing about 3s. each. He had excellent ones made of some kind of steel at 6s. each; but this was rather too dear. He was practically satisfied with the cheaper ones, and found that they lasted about six months, the sets on each roller being replaced alternately, at intervals of three months.

The President said these were two very practical papers on a very practical subject. In the north they had a different quality of coal to deal with, and the coke produced was unsuited for domestic purposes. Still they managed in Glasgow to sell about 80,000 tons a year, by far the larger portion of which went for a purpose for which it would not at first sight appear very suitable—viz., for use in smelting furnaces. Of course, they only obtained a low price. He thought the best means which could be adopted for developing the sale of coke for domestic purposes was to pay more attention to the stoves and fireplaces in which it was burned; for it was the difficulty of burning it more than anything else that prevented its more general use. He knew the fires to which Mr. Sugg had referred in Paris. They were very cheap and efficient; and he did not know why they could not be introduced here. Why should not gas companies sell them or hire them out, as they did gas stoves for cooking and heating?

Test of Refrigerating Apparatus.

The approaches to the great bridge which spans the East River are immense structures of masonry, and these arches or vaults have been utilized in a sensible manner by closing them at either side and converting the rooms thus formed into cold storage warehouses, for the purpose of keeping articles which would be perishable at the natural temperature. This system of refrigeration is based upon the volatilization of anhydrous ammonia, and the heat absorbed in this evaporation of the ammonia chills a solution of chloride of calcium, which circulates through pipes in the warehouse, and reduces the temperature by direct absorption of the heat radiated toward the pipes.

These refrigerating machines were installed under a contract guaranteeing that each one should have the capacity of absorbing, every 24 hours, a quantity of heat sufficient to melt 40,000 lbs. of ice, The question of their conformity to the specifications was referred to Messrs. Collingwood, Martin, and Abbott, all members of the American Society of Civil Engineers, and they found that each machine possessed a refrigerating capacity equivalent to the melting capacity of 43,595 lbs. of ice, or 9 per cent. in excess of the contract.

The weight of the solution used was 73.48 lbs. per cubic foot, or 1.16314 specific gravity, and its specific heat was found by experiment to be .827. The brine was measured by a water meter, and differences in temperature indicated by a thermometer. They avoided a frequent and inexcusable error by ascertaining the specific heat of the solution by actual experiment, instead of assuming it to be unity. There is no statement made relative to the kind of thermometer used, but for low temperatures alcohol would be superior to mercury thermometers.

The efficiency of the apparatus for 24 hours was found by adding the products of the cubic feet of brine circulating through the pipes by the corresponding differences in temperature in the ingoing and outgoing

currents of brine as observed at frequent intervals, and this sum was multiplied by the specific heat of the brine (.827) and its weight per cubic foot (73.48), and the final product—applying all allowances for corrections from various sources—amounted to 6,218,816 heat units as the amount abstracted in 24 hours.

According to the determination made by Dessains and De la Provostaye, 142.65 British thermal units are necessary to melt 1 lb. of ice; and therefore this apparatus has a refrigerating capacity equivalent to that produced by 43,565 lbs. of ice in 24 hours. This result was accomplished by the combustion of 2,000 lbs. of coal under the boiler operating the pump condensing the anhydrous ammonia vapor. If this coal possessed a theoretical calorific value of 13,500 heat units per pound, the total amount of energy of combustion in 24 hours would be $2,000 \times 13,500 = 27,000,000$ heat units, and the result of the process of transformation of energy was, as already stated, 6,218,816 heat units, showing an efficiency of 23 per cent., which is certainly very high in comparison with other methods of transformation of energy in connection with prime movers; and it is safe to assume that it would be practicable to increase this ratio of efficiency with a plant on a larger scale.

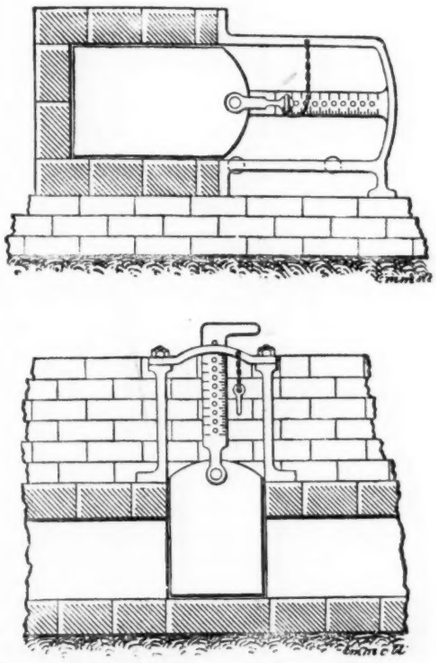
Humphrys' Patent Damper Frame for Furnaces.

Our versatile and accomplished English correspondent would seem to be a tolerably busy man, judging from the fact that he is Engineer to the Salisbury Gas Company (which sends out about 70 millions cubic feet of gas per annum), is a frequent contributor to the English technical journals, and is often called upon to give his fellows the benefit of his judg ment and experience in the matter of experiments, analyses, and the like. However, the multiplicity of his avocations does not appear to have prevented him from taking a hand in the field of invention, in proof whereof we submit the following description (reprinted from a late issue of the London *Journal*) of a patent damper frame for furnaces, which he has recently placed on the English market. Our authority says:

The increased attention that has of late been directed to the combustion of fuel, with a view of securing the full heating power of the material, and also the avoidance of smoke, has created a demand for a better and more delicate method of adjusting the area of the opening controlled by the damper than the various rough-and-ready plans that are at present generally adopted. Especially in the case of furnaces on the generator system is a delicate adjustment of the damper area, both in respect to the air supply and to the products of combustion, of importance. And whether it be for the generation of steam, for heating retorts at gas works, or, in short, for any kind of furnace, the advantage gained by being able to accurately adjust the damper goes without saying. Mr. Norton H. Humphrys, of Salisbury, having experienced a difficulty in obtaining an accurate adjustment of dampers in the retort house, especially in connection with closing them during 12 hours' stoppage on Sundays, has directed his attention to overcoming the same, and the result is the invention we are about to describe.

One of the first conditions ascertained was that, in order to secure thoroughly satisfactory results, the regulating apparatus must be a sclose as possible to the damper itself; as all devices comprising chains passing over pulleys and carried to the front of the furnace, and such like, are unreliable for practical working. The chains are apt to expand and contract according to the variations in temperature to which they may be exposed, and also to stretch slightly under the constant tension to which they are subjected. Since a variation of only ½ inch may lead to erroneous results—and such a variation may readily occur over a length of 40 to 50 feet of chain—it is obviously impossible to secure, under such conditions, the accurate adjustment that is indispensable for modern kinds of furnaces. It is claimed that the arrangement now under notice will admit of delicate and reliable regulation, so that, if desired, the damper may be closed entirely, and subsequently replaced with absolute certainty in exactly the original position, by a momentary operation, capable of being performed by an ordinary laborer, and in the dark if necessary; also that it is simple in construction and easily made, being free from screws or other mechanical parts likely to get out of order or be interfered with by dust or dirt.

The salient features of the invention (which is made in several modifications, to suit the size and position of the dampers for which it is to be used) are a frame for receiving the portion of the damper drawn out of the flue, a graduated bar, perforated at suitable intervals either with slots or round holes, a handle, an adjustable connecting link, and a linch-pin. These may all be in separate parts, connected together by bolts and nuts, or in any convenient manner, or any two or more may be joined in one piece, according to requirements, the size of the damper, and the direction of travel; and the various modifications admit and include the fixing of the frame above, below, or on either side of a horizontal flue or a vertical flue, and, of course, are equally applicable to flues inclined at any angle. The specification also includes the use of guide rollers and counterpoise weights, the enclosure of the arrangement completely, by adding plates on each side of the frame, and adapting a lock or padlock so as to secure the damper from being tampered with by unauthorized persons. The frame may be of cast or wrought iron, as preferred, and the other parts of wrought iron. In width the frame is made rather more than the thickness of the damper, so as to protect it from accidental injury. The measurements on the bar may be simply lineal, or may show the area of the opening left by the damper.



Humphrys' Patent Damper Frame for Furnaces.

The engravings show two forms of applying the arrangement—fig. 1 being suitable for a horizontal, and fig. 2 for a vertical travel of the damper. In the former the graduated bar may be cast in one piece with the frame, or attached to it; and the handle is fixed to the link, which also carries a perforation corresponding to those on the bar. The frame, with the linch pin connected to it by a loose chain in a convenient position, having been fixed, the damper is placed in position, and the adjustable link with handle connected thereto. The damper being close home, the link is adjusted so as to make the perforation in it exactly register with that representing the zero mark on the bar, when the linch-pin will en gage with both holes. In this position the damper is closed and maintained so. Let us now suppose that the damper is to be opened to the extent of 6 inches, which with a 12-inch damper would give an area of 72 square inches. The pin is removed, the damper drawn out by means of the handle until the perforation on the link registers with that corresponding to 6 inches or 72 square inches on the scale, and the pin again inserted and fastened with a padlock if desired. In like manner other widths of opening may be obtained, the scale and number of perforations being adapted to the width of the flue and the degree of delicacy of adjustment required.

Fig. 2 shows a simple and cheap modification for rough work, The frame is made in three pieces, and the perforated bar and link in one piece. The uprights having been secured to the brickwork by projecting tongues which are built in, the damper is placed in position as closed, and the link and bar affixed. The bridge-piece, which has a slot for the bar to travel in, is then put on, and so adjusted by introducing washers on the threads which receive it at the top of the upright pieces that the hole corresponding to the zero mark is just capable of receiving the linch-pin above the bridge-piece. The handle is then attached to the top of the bar. The manner of working will be obvious from the description of the other arrangement. The handle is grasped with one hand, and the pin removed with the other. The damper is then pulled up until the perforation corresponding to the desired extent of opening comes above the slot,

when the pin is inserted, and serves to support the whole arrangement.

In fig. 2 the device is shown as applied to one of a series of furnaces, opening into a bottom main flue situated immediately behind them.

Richard Brothers' Standard Gas Gauges.

M. Jouanne, writing in a late issue of *Le Gaz*, calls attention to the fact that the glass tubes or gauges generally used in gas works present certain inconveniences well known to gas men, especially with reference to reading the two columns, ordinarily out of level, and usually covered with a greasy film, which makes its appearance with surprising quickness. The latter condition, of course, necessitates a frequent dismounting of the tubes so that they may be cleaned. Now, that is not always an agreeable operation, and under any and all circumstances constitutes one of the petty annoyances of the gas maker's trade, which albeit of no very vital importance, is nevertheless one of those things that it would be well to get rid of.

In furthering the attempt to dissipate that annoyance he thinks it may interest the readers of *Le Gaz* to hear that an instrument to do away

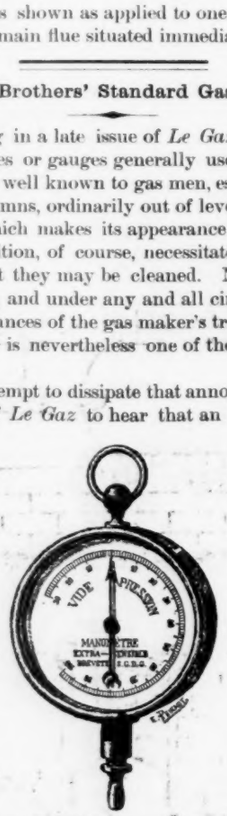


Fig. 1.—Dial-Plate Gauge for Determining Gas Pressures and Chimney Draughts.

with the vexatious glass tubes, and at the same time present an arrangement as practical and as agreeable as any of the dial-plate gauges employed to register high pressures, has been placed on the market.

This apparatus, constructed by the Messrs. Richard Brothers, is, to all intents and purposes, a small dial-plate gauge. It is very sensitive, quite easy to read, and easily portable. It can not only be used as a stationary gauge, but may also be employed to determine the pressure existing in

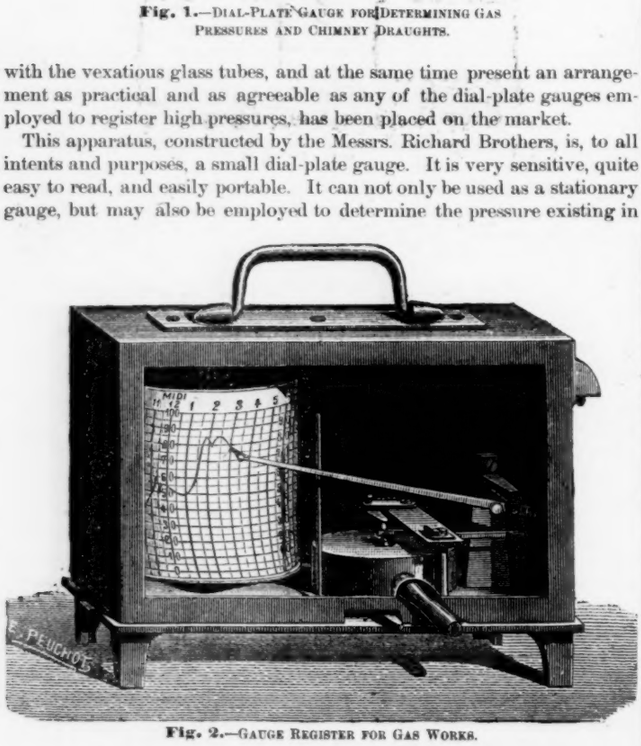


Fig. 2.—Gauge Register for Gas Works.

mains. Further, it is sensitive enough to measure the draughts in chimneys and flues.

Figure 1, which gives a front view of the instrument, renders unnecessary any detailed description of the arrangement of the parts. The pressure of the gas exerted on a very sensitive flexible membrane puts the indicating needle in play in a manner analogous to the working of high pressure gauges.

The Messrs. Richard Brothers have brought out still another apparatus which recommends itself to the favorable attention of the managers of gas works. This device is a registering gauge capable of indicating the smallest pressure and vacuum, and consequently permitting the examiner to observe and note correctly the variations of pressure at different parts of a main, the draught in the benches of retorts, etc.

Figure 2 shows the mechanism of the apparatus. The gas enters, by means of a rubbber pipe, in the small cylinder fastened to the bottom of a rectangular box, and actuates a flexible membrane, whose movements of depression or elevation put in play a jointed lever that carries, at its extreme end, the pen which traces the diagram on a sheet of paper that is rolled conveniently around a drum. The rotation of the drum is produced by means of a clockwork mechanism, as in ordinary pressure indicators, and in the greater number of known registering apparatus. This gauge, being small in size and easily carried, seems to us likely to be of great assistance on many occasions.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Work in Progress at La Crosse, Wis.—Mr. Geo. McMillan, Superintendent of the La Crosse Gas Light Company, cannot have had many idle days this summer, for he has been kept quite busy directing the movements of the workmen engaged in perfecting the plant improvements mapped out by the Company last spring. The principal items in the list of betterments include a telescopic holder, and an extensive addition to the purifying system, which latter extension guarantees an ability to pass 400,000 cubic feet per diem through the boxes. While the Company's sendout has not yet reached that maximum, Mr. McMillan reports that, in consequence of the greatly extended use of gas stoves in La Crosse, he believes the purifying system will at no distant day be no more than adequate for the Company's needs. The holder now in process of construction is to have a capacity of 140,000 cubic feet, and it will be of immense value to the Company, for the La Crosse folks have been working pretty close to the wind in the matter of storage facilities. The ground in which the tank was sunk proved to be of the solid sort, although it was found necessary to put in some timberwork on the bottom. The tank wall, of brick, is 36 inches at the base, diminishing to 26 inches at the top, and rests on a solid foundation of concrete. It is estimated that the entire cost of the holder and tank will be in the neighborhood of $16,500, and that sum, we presume, will have been about doubled when the purifying plant extensions and other general betterments are paid for. Perhaps it is just as well that Bro. McMillan's vacation was curtailed, because the work that necessitated his "sticking to business" this summer will furnish a recompense, in the shape of guaranteeing to him a mind at ease during the dark hours of the coming winter.

Electric Light at Kingston, Canada.—We understand that all the plant requisite for lighting the city of Kingston by electricity has been purchased, and that the work of erecting the same is now in progress.

Turned on at Quebec, Canada.—While Kingston anticipates the coming of the light of the future, Quebec now basks in the full glow of the sparkle from betwixt the carbon points, the current having been turned on about a fortnight ago. The new departure was inaugurated with music and "cheers," and several hundred people gathered about the musicians, who were appropriately grouped or perched in eligible situations on Dufferin Terrace, ushered in the electric illuminant to the strains of, "See, the conquering hero," etc. The power that operates the Quebec electric light plant is derived from the Falls of Montmorenci.

To be Lighted by Gas.—We understand that responsible parties are negotiating for the right to operate a gas works in Marysville, Ohio, with every prospect that their demands will be acceded to. Marysville is the capital of Union county, Ohio, and is located in Paris township. Mill Creek runs through the place, as also does the railroad which connects Delaware with Springfield. It is 17 miles west-southwest of Delaware, and 28 miles northwest of Columbus. Marysville gives promise of becoming an important business center. In fact it may be said to have achieved considerable prominence already, since it contains a good court house building, 4 banks, 5 churches, and a grammar school, and supports two newspapers. An extensive growth of hard wood surrounds the place, and that material gives work to a large number of persons who are employed in the manufacture of butter tubs, wagon spokes, etc. Population about 4,500.

Likely to be Consolidated.—Rumor has it that the owners of the New Bedford (Mass.) Gas Light Company have instituted negotiations

looking to the purchase of the local electric lighting company's franchise. [The purchase has been made.]

DIVIDEND DECLARED.—At a meeting of the Directors of the Vicksburg (Miss.) Gas Light Company, held during the last week of July, a dividend of 2½ per cent. was declared out of the earnings for the last six months. The Company seems to be in fairly prosperous condition, although much yet remains to be accomplished in the matter of plant betterment. That remark applies, perhaps, more particularly to conduit improvements.

IMPORTANT PATENT LITIGATION.—According to late advices it seems that Dr. Otto, of Germany, the inventor and patentee of the justly celebrated gas engine bearing his name, has commenced an action in the United States Court, Southern District of New York, for an injunction and heavy damages, against parties making and using the motor known as the Korting gas engine. Among those impleaded as defendants we note the names of Messrs. Adolph Witteman, Geo. F. Sturken, Jno. C. Seaman and Melville C. Thwing, all of this city. Dr. Otto is in earnest about the present suit, and the trial developments ought to furnish interesting reading to the gas fraternity of this country.

DEATH OF THE PRESIDENT OF THE DAVENPORT (IOWA) GAS COMPANY.—We regret exceedingly to have to announce the death of Mr. C. E. Putnam, late President of the Davenport Gas Light Company. Beyond this meager statement we are at present unable to go, but hope at some future time to place before our readers a few facts connected with his busy life.

BAPTIZED ANEW.—Brother Norton and his associates, seemingly not satisfied with the scope of their former line of action, and having obtained the necessary legislative consent, have decided that the old Nashua Gas Light Company, *per se*, is a thing of the past—as far as its former corporate title is concerned. The present corporate title is that of the "Nashua Heat and Power Company," and the capital stock is limited to $200,000. The old-new Company now has the right to supply any and all sorts of artificial light. May its future in the new order of things be as prosperous as was that of its past.

IMPROVEMENTS AT ADAMS, MASS.—The owners of the Adams Gas Light Company are extending their delivery system. The principal addition consists of a new 6-inch main, in Park street, that is to terminate at the junction of Commercial and Center streets.

A QUEER CASE.—According to Newark (N. J.) advices, the case of Alden vs. the Citizens Gas Light Company of that city, which case has been in litigation for something like 20 years, was recently revived on a motion made by R. Wayne Parker, counsel for the plaintiff, for the correction of a verdict. It seems that the Gas Company took the property on which its plant is now located subject to the dower interest of Mrs. Alden, and subsequently became mortgagor in possession through the assignment of a mortgage for $1,800. Tax titles and other complex questions were disposed of, and, as the dower could not well be assigned without injury to the works, in 1878 a sheriff's inquiry resulted in a verdict fixing the widow's annual income interest in the property. To this was to be added interest for eight years, and Mr. Parker claimed that, instead of calculating the interest on each item for 8, 7, 6, etc., years respectively, interest had been calculated on but one item, and multiplied by 8. The Gas Company, by Thos. N. McCarter, contended that the verdict, after the end of the term of Court when it was returned, could neither be altered nor corrected, and the Court held that Mr. McCarter's argument or view was correct.

ONE RESULT OF THE BROOKLYN (N. Y.) GAS RATE.—In 1886 the assessment rolls for the city of Brooklyn showed that the gas companies of the city were assessed, in the item of stock values as a basis for personal property taxation purposes, at a total of $4,135,500, whereas the corresponding return for the current year shows the valuation to have been put at $3,323,400, or a decrease of $812,100. The Brooklyn *Daily Eagle*, in commenting on the above fact, says: "The difference ($812,000) represents the depreciation in value of gas stock during the past twelve months, occasioned largely by the recently enacted law of Senator Griswold, reducing the price of gas in this city from $2 to $1.60 per thousand cubic feet, but due in a measure also to the competition of electric lights."

THE WATERHOUSE ELECTRIC LIGHTING SYSTEM.—The proprietors of the Willimantic (Conn.) Electric Light Company, who operate under the Waterhouse system, have recently increased their plant, and are now supplying both arc and incandescent lights (taken from the same circuit) to their customers.

THE ANNUAL REPORT, ENGLISH PATENT OFFICE.—The Report of the Comptroller of the English Patent Office, for the year 1886, has been presented to Parliament. From it we learn that the numbers of applications for patents for the three years during which the last Patent Act has been in force are as follows: 1884, 17,100; 1885, 16,101; 1886, 17,162; 14,822 of the '86 applications were accompanied by provisional specifications, and 2,340 by complete ones. Of the applications for the year 1885, 54 per cent. were proceeded with, as compared with 58 per cent. of those of 1884. Up to the present date no applications have been received for the granting of compulsory licenses, a provision permitting such applications having been introduced for the first time into the Patent Act of 1883. Only three volumes of abridgements, and all of those in continuation of former series, have been issued during the year. The report fails to mention what progress has been made with the new subject-matter indexes, which, according to statements uttered before the Departmental Committee of the Patent Office, were shortly to be issued. The total receipts of the office during the year amounted to $534,770, the payments amounting to $547,835, leaving a deficit of $13,065. This deficit, however, is really only an apparent one, because the whole cost of the purchase of certain new offices, amounting to $131,760, is charged to the year under review. 23,717 designs and 324 sets of designs were registered during the year. The total number of applications for trademarks was 10,677.

NEW PUBLIC WORKS AT CANTON, DAK. TER.—The Canton Improvement Company has asked the local council for an exclusive franchise to construct and operate water, gas, and electric light works within the town limits. The applicants agree to supply the authorities with 16 fire hydrants for town purposes, provided an annual total rental of $800 is paid for the same. The petition is likely to be acted on favorably. Canton is the capital seat of Lincoln county, Dak.; is on the Big Sioux river, at a point opposite Beloit, Iowa; and is 41 miles west-northwest of Sheldon, Iowa. It is growing with amazing rapidity.

GASEOUS DOINGS AT DES MOINES, IOWA.—Brother Pratt, the former Superintendent of the North Attleboro (Mass.) Gas Light Company, but now in charge of the Capital City Gas Light Company, of Des Moines, Iowa, is "doing quite well" in his new field of action. An auxiliary water gas plant has been added to the Capital City works, and, as we understand it, an illuminating product composed of one-third water gas and two-thirds coal gas is now being sent out from the works. The Des Moines *Register* asserts that $40,000 have been expended in perfecting the Capital City Company's manufacturing plant.

CAPITAL INCREASED.—From a certificate filed with the Albany (N. Y.) authorities, we learn that the capital stock of the Salamanca Gas Company has been increased to $60,000. Former capital, $30,000.

TO SUPPLY ELECTRIC LIGHT.—The proprietors of the Rome (N. Y.) Gas Light Company have petitioned the City Council for an amendment to their charter which will permit them to furnish incandescent electric lights for domestic lighting.

AT WORK ON THE STATION.—The contractors are busily engaged in carrying on the work of constructing the Brush electric light station at Geneva, N. Y. The plans call for the erection of a building 40 ft. in width by 100 ft. in depth, the skeleton to be of wood, with a covering of corrugated iron.

IN REGARD TO THE SALE OF THE ONEIDA (N. Y.) GAS LIGHT COMPANY.—A recent issue of the Utica *Herald* contained the following: "A current rumor, which appears to have much foundation on fact, is to the effect that the Oneida Gas Company has sold its plant and franchise to parties from New York and Rhode Island. It is asserted by some that the sale is in the interest of the American Electric Light Company, and that in fact the contract is complete for the sale and transfer. This, however, is not substantiated by the Gas Company, the President of which says that parties from New York and Providence have been negotiating for the purchase of the plant, and that while the contract is not yet complete, the indications are that the deal will undoubtedly be consummated. There are certain conditions yet to be fulfilled before the contract could be said to be closed. A clear majority of the stock must be transferred, and the President was busy interviewing the stockholders in an attempt to gain the assent of a majority to the sale. The officers will see every stockholder, so as to give each of them an opportunity to dispose of his holdings. The President also said that the parties negotiating for the

plant are others than the American Electric Light Company. The presence in town of a couple of the officers of that Company led to the belief that they were the parties who were after the gas plant. In the event of the transfer being completed, possession will not be given until Sept. 1, when the former proprietors of the Oneida Gas Light Company will step down and out."

PROPOSED NEW GAS COMPANY.—Martinez (Cal.) is to have a gas works. This place is the capital seat of Contra Costa county, and is on the south shore of Suisun Bay, at the east end of the Strait of Carquinez. It is some 36 miles (by water) northeast of San Francisco, and 3 miles south of Benecia. The climate is very even, and the soil is quite fertile.

TO BUILD A NEW STATION METER.—The American Meter Company is under contract to construct a station meter to the order of the Utica (N. Y.) Electric and Gas Company. It will be finished in ample time to register the coming winter's output.

LOWELL'S NEW HOLDER.—The Lowell (Mass.) Gas Light Company's new holder is well underway. In fact it is expected that Oct. 1st will find it in working duty. Its capacity is rated at 750,000 cubic feet, and the Lowell *Citizen* calmly predicts that, owing to the increased storage facilities thus created, the Gas Company will probably be enabled pretty soon "to reduce its selling rate to $1 per thousand cubic feet." We hope so; but Bro. Cushing is the one to speak with authority about such things.

SUIT AGAINST THE COUNTY OF GALVESTON, TEXAS.—The cases of the Galveston Gas Company and the Galveston Wharf Company vs. the county of Galveston came up for hearing on July 25th, in the Galveston District Court, after having remained in abeyance for some time. These suits were originally instituted against the county in the year 1876, the plaintiffs alleging as a cause for action that the authorities had imposed an illegal assessment upon them, and the suits were brought with a view to compel the county to return the moneys paid under the alleged wrongfully imposed assessment of 1876. Each plaintiff contended that, in the year cited, it had been assessed considerably in excess of the actual valuation of the property, and sought reimbursement. The case of the Galveston Gas Company was primarily heard in the District Court, at which time it was agreed that the Wharf Company should accept the decree rendered in the trial case. The first hearing was decided in favor of the county; but an appeal from the ruling, argued in the Supreme Court, resulted in a reversal of the judgment of the lower court, and a remanding of the case back to the District Court. It seems that the county is likely to be worsted this time. The amount at stake in the case of the Gas Company is $1,949.60, which, with interest for 11 years, would make a very acceptable addition to its treasury.

BROTHER DENNISTON AT IT AGAIN.—The following announcement has recently been made to the gas consumers on the roster of the East End Gas Company, Pittsburgh, Pa.: "On and after Oct. 1, 1887, the price of illuminating gas will be as follows—prompt payment to be observed in all instances:

Monthly Consumption.	Net Rate.
8,000 cu. ft. or over	$1.00
5,000 "	1.12½
2,500 "	1.20
Less than 1,000 cu. ft.	1.30"

Now, we submit that this is evidence of Brother Denniston's good intentions, and we expect that he will soon have to add more Critchlow-McKay machines to the present East End plant. The $ mark keeps cropping out; and often may it do so.

OIL CITY (PA.) GAS RATES.—The proprietors of the Oil City Gas Company have determined upon the following selling rates, as per notice given during the last week in July: The following rates will be charged for gas (natural) for illuminating purposes, from and after Aug. 1—

Nature of Service.	Per Month.
One jet	$0.20
Two or more jets, each	.15
Siemens lamp, small	.50
" " large	.75
Lungren lamp, small	.40
" " large	.50
Street torches, ¼ opening	1.00

STREET LIGHTING AT BELLEVILLE, ILLS.—It is reported that the St. Clair Steam Supply and Electric Light Company will light the streets of Belleville for the next three years. By the proposals submitted the Company offered to maintain 75 arc lamps at an annual charge of $125 each, but if 100 (or over) lights were to be maintained, each lamp would be supplied at an annual charge of $120. We cannot say which proposal was accepted.

PUBLIC LIGHTING AT DETROIT, MICH.—The Aldermanic Board some time ago decided to accept the terms of the bid for public lighting submitted by the Brush Company, and the matter was then forwarded to the Mayor for final sanction—the Brush Company was awarded the contract for a three-year term. It was not supposed that the Mayor would offer any objection to the decision of the Board, but a correspondent informs us that "The most prominent feature of the Aldermanic session held Aug. 3 was the reception of a communication from the Mayor by which that official vetoed the three-years public lighting contract with the Brush Electric Light Company. The Mayor, in explanation of his adverse action, said that a three-years contract would result in but trifling advantage to the city, because the rebate or shrinkage on the payment really figured out only $15,900, were the three-year contract to prevail instead of accepting the Company's offer for one year. If the long-term policy were to be agreed to the city would be shut out from all benefit that might accrue from advances made in the generation and distribution of electric light during the life of the contract. The Mayor further said that lighting by gas was being rapidly improved and cheapened, and that it would be unwise to shut the city out from any possible benefit in such direction by entering into a long-term contract with the Brush Company. The Mayor also mentioned the fact that the Brush Company had ignored the ordinance requiring it to place its wires underground." Detroit evidently is ruled by a Mayor whose action is founded on common sense, and who also has the courage to "speak right out in meetin'." The veto message commanded close attention, and was not without effect on some of the "long termers," although Ald. Burt, who we believe is a firm believer in arc lighting in general, and a decided advocate of the Brush system in particular, immediately seized the bull by the horns in offering a motion "that the resolution authorizing the City Controller to contract with the Brush Company for three years be passed, notwithstanding the veto of the Mayor." Others of the long termers, seemingly disposed to deal tenderly with the aforesaid "horns," suggested that Ald. Burt's motion indicated undue haste. This idea found favor with the majority, and a motion to table the matter prevailed. In the meantime it looks to us as if the Detroit Aldermen (or at least some members of that body) were dangling somewhere between the devil and the deep sea. In either event the danglers are not on very solid footing, especially since it is unlikely that they are either salamandrine or web-footed.

MESSRS. P. H. & F. M. ROOTS PREPARING FOR A BUSY SEASON.—The Messrs. P. H. & F. M. Roots, of Connersville, Ind., in order to keep pace with the demands made upon them for their well-known specialties, have found it necessary to make large additions to their buildings. When these improvements have been completed (the scheme of betterment will involve an expenditure of about $18,000) the Company will have as complete facilities for filling orders and turning out work as any other manufacturing establishment in the country. The Messrs. Roots have just issued their new gas exhauster catalogue, a copy of which will be mailed to anyone who addresses them at their headquarters in Connersville, Ind.

PERSONAL.—Mr. A. B. Stannard, although somewhat browned by travel, is as brisk and alert as ever. He tried the celebrated Hoyt estate elevator, which has done duty for several years in numerous Pine street mansions (of course, No. 42 is one of these), and although inclined to complain about the principle on which the said elevator is constructed, he had "breath" enough left to say that the tan on his cheeks was caused by the necessity which obliged him to be constantly on the road as a trusted Special Agent of the American Water Works and Guarantee Company, whose headquarters are at present in Muncie, Ind. We understand, however, that the Company, owing to the many and extensive franchises now controlled by it, will shortly locate in one of the largest cities in the West. The Company is a sterling concern, and in Special Agent Stannard it has secured a bright and energetic attache. May good luck follow him in his travels.

NEW GAS COMPANY.—Responsible parties have determined to organize a gas company in the town of North La Crosse, Wis. Why this step should be taken we fail to understand, for it would seem as if the La Crosse Gas Light Company (if we mistake not, North La Crosse is really a ward of the city of La Crosse) was quite equal to the duty of furnishing all the illuminating gas needed in that locality. Perhaps Supt. McMillan,

of the old La Crosse gas plant, would post us in respect to the proposed new company.

AND YET ANOTHER.—Pomona, Cal., is to have a gas company—this, we think, is the seventh gas company that has been proposed in the Golden State during the present year. Pomona is in Los Angeles county, Cal., and is on the Yuma division of the Southern Pacific Railroad. It is 33 miles east of Los Angeles.

MESSRS. R. & J. DEMPSTER TO DO THE WORK.—Some time ago we noted that Messrs. C. & W. Walker, of London, England, were to build a holder (1,200,000 cubic feet capacity) to the order of the Toronto (Can.) Gas Light Company. We can supplement that statement by saying that the Messrs. R. & J. Dempster, of Manchester, England, have received an order from the Toronto Company for a wrought iron roof for a retort house now in process of erection. The house has a dimension of 302 feet by 76 feet, and the Messrs. Dempster have agreed to deliver and fix the roof within a period of 16 weeks from the date of signing the contract.

A WORD OR TWO FROM WHEELING, WEST VA.—It has been determined to add a Pelouze and Audouin condenser to the plant of the Wheeling gas works. Mr. Jas. Dyson, who has for some years most creditably filled the position of City Gas Inspector at Wheeling, has resigned in order to accept a similar office in the service of the Natural Gas Company, of West Virginia.

INTERESTING FIGURES.—We are indebted to Mr. Charles Nickson, Supt. of the Manchester (England) Corporation Gas Works, for a copy of the "abstract of the accounts" of that huge undertaking for the year ended March 31, 1887. From this source we learn that the total quantity of coal (including cannel) carbonized during the year was 292,335 tons, which produced 3,021,682,000 cubic feet of gas, or an average of 10,336 cubic feet per ton of coal carbonized. The quantity of gas transmitted from the works, in comparison with that sent out last year, shows an increase of 4.47 per cent.; but the quantity measured and accounted for shows a gain of 6 per cent., which latter is largely attributable to the fact that the loss from leakage and condensation (1887) was 6.34 per cent., as compared with 7.69 per cent. for 1886. The illuminating power of the gas averaged (mean of 4 daily readings) 19.44 candles, and was fully equal to legal requirement in respect of freedom from impurities. The largest quantity of gas ever consumed in Manchester in one day occurred on December 30, 1886, when 19 millions cubic feet passed through the station meters. During the week ended December 23, 1886, the consumption reached a total of 107,291,000 cubic feet. The number of gas cookers, heaters, etc., out on hire on March 31, 1887, was 1,609, or an increase of 165 as compared with the previous year. The capital invested in these appliances is £4,534, and the amount received for hire was £521. The estimated quantity of gas consumed by the stoves is 14,207,400 cubic feet, yielding a revenue of £1,999 12s. 10d. The total amount of gas rentals, meter rents and stove hire was £371,197 14s., being 2.72 per cent. increase on the previous year, and the year's work resulted in a gross profit of £92,200 13s. 6d., street lighting maintenance, interest charges, and sinking fund requirements reducing the gross to £25,452 net profit. The maximum charge for gas was 2s. 8d. per thousand cubic feet. The total number of meters in use is 77,655, or an increase for the year of 975. The total length of mains is returned at 657 miles. This shows that Mr. Nickson has the care of a huge establishment. One feature that seemed peculiar to us is the comparatively small number (1,609) of cooking and heating stoves in use, when compared with the large number (77,655) of consumers' meters in duty.

GOING ON WITH THE GOOD WORK.—The new proprietors of the Utica (N. Y.) Electric and Gas Company are actively engaged in extending their conduit system, which by Sept. 1st will have had 9 miles added to its former length. A Lungren lamp is to be placed in the assembly room of the City Council.

TO LIGHT THE CITY'S WHARVES.—The contract for lighting the principal wharves in Pittsburgh, Pa., has been awarded to the Allegheny County Light Company. The Company is to furnish twenty 2,000-candle power arcs, receiving therefor $180 each per annum. Is not that a pretty steep price?

POSTPONED.—The sale of the right to erect poles and to string wires for the purpose of furnishing a complete system of arc and incandescent lights and motor power for Flushing, L. I., which was to have taken place in the Town Hall, at 4 P.M., Monday, Aug. 1, was postponed until the first Monday in September, same hour and place. Mr. Jno. H. Wilson, President of the Board of Village Trustees, naively explains that no sale was had on the appointed day because of the non-attendance of bidders. Sufficient reason, surely. Better luck in September—perhaps. It will be cooler then.

TO BE RUN BY AN OTTO GAS ENGINE.—The Washington (Ind.) Gas Light Company has purchased an arc light plant of the Waterhouse type. It is to be operated by a 25-horse power Otto gas engine.

PRICE OF GAS REDUCED.—On Aug. 3 the Directors of the Ottawa (Can.) Gas Light Company decided to reduce the price of gas to $2 per thousand cubic feet.

CONSOLIDATED.—The Excelsior Electric Light and the Stillwater Gas Light Companies, of Stillwater, Minn., have been consolidated. It is expected that the water gas plant now in process of erection will be ready for duty by Oct. 1.

WILL THEY GET A CONTRACT?—At a meeting of the Des Moines (Iowa) City Council, held on 1st inst., Alderman Morris succeeded in securing the passage of a resolution ordering that bids be received from the electric light companies for lighting the city when the present contract with the Capital City Gas Light Company shall have expired. Ald. Morris is taking time by the forelock, for the gas contract holds good until Jan. 1.

THE SUBSCRIPTION BOOKS ARE OPEN.—At a recent meeting of the Directors of the Louisville (Ky.) Electric Light Company, held Aug. 2, J. S. Briggs was elected President and E. B. Lapping was chosen Secretary and Treasurer. Books for the purpose of entering the names of intending stock purchasers were opened. The Company's officials are in communication with the owners and patentees of several systems of electric lighting, but have not yet determined upon a selection.

ANNUAL ELECTION, JAMAICA PLAIN, MASS.—At the annual meeting of the Directors of the Jamaica Plain Gas Light Company the following Directors were chosen: Messrs. John C. Pratt, C. F. Curtis, A. H. Wing, M. R. Wendell, A. J. Peters, I. P. George, and F. Seaver. Subsequently Mr. John C. Pratt was elected President, Mr. I. P. George being chosen Clerk and Treasurer. A semi-annual dividend (the 60th) of 4 per cent. was declared.

A TIE VOTE.—At at special election, held on Aug. 8, by the taxpayers of the town of Canastota, N. Y., for the purpose of determining whether or not the sum of $2,000 should be raised by special tax for lighting the streets by electricity during the ensuing year, 166 votes were polled. A count proved that 83 were in favor of the project, while an equal number opposed the plan. Another ballot has been ordered.

Driving Dynamos with Short Belts.

An English authority asserts that when fast dynamos are driven by belting there is a waste of power owing to friction between the driven spindle and its bearings. This is usually kept small by using a long belt so as to obtain a long angle of contact of the belt with the small driven pulley. But long belts are inconvenient, and in confined spaces, as on board ships or in guards' vans, impracticable. But with small belts used in the ordinary way the small angle of contact of the belt with the driven pulley necessitates a large tension on the belt, causing considerable pressure on the bearings and waste of power by friction. Various plans have been devised for overcoming this difficulty; for instance, the tightening pulley of Messrs. Mather and Platt, and forms of friction gearing, including the ingenious one of Mr. J. S. Raworth for driving dynamos.

Professors Ayrton and Perry have recently brought out another method. It consists in hanging the dynamo pulley from a short belt passing round the engine flywheel, the belt being only just long enough to embrace the flywheel and dynamo pulley without the two being brought into contact. The dynamo is supported so as to turn round an axis at right angles to the axis of rotation of the armature. The method of fixing the dynamo is to remove the pulley from the spindle and fix the dynamo in a cradle turning on trunnions in such a position that the dynamo and cradle just balance. Then if p_1 p_2 be the pressure of the armature spindle on the two bearings, respectively nearer to and further from the pulley end of the dynamo, p_1+p_2 will be equal to the weight of armature commutator and spindle. The pulley, which is heavier than an ordinary dynamo pulley, and of cast iron, is now keyed to the armature spindle and hung in the belt, and as the entire weight of the pulley is supported by the belt, the dynamo by itself still balances, and the pressures on the bearings are simply p_1 p_2 as before.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

Editor—JOS. R. THOMAS, C.E.
Asst. Editor—T. J. CUNNINGHAM.
Manager—C. E. SANDERSON.

PUBLISHED ON THE 2ND AND 16TH OF EACH MONTH
At No. 42 Pine Street, New York.

This is a recognised official organ of—
LIGHT, HEAT, STEAM, WATER-SUPPLY, VENTILATION, SANITARY IMPROVEMENT, AND GENERAL SCIENCE.

TERMS
SUBSCRIPTION—Three Dollars per annum, in advance.

AGENTS
NEW YORK—AMERICAN NEWS Co. 39 and 41 Chambers St.
BOSTON—S. M. PETTENGILL & Co., 6 State Street.
PHILADELPHIA—PRATT & Co., Corner 9th and Arch Streets.
England—C. W. HASTINGS, 72 Buckingham St., London, W C.
Germany—B. WESTERMANN & Co., of New York

TUESDAY, AUG. 16, 1887.

Notes from the West.

By RETORT.

AUGUST 8, 1887.

Mr. H. C. Thompson, the former agent of the American Meter Company, at Cincinnati, O., assumed charge of the Spokane Falls, Wash. Ter., Gas Company on August 1st.

Mr. Chas. S. Ferson, bookkeeper for the Council Bluffs (Ia.) Gas Company, was drowned while boating on Lake Manawa on August 5th. Mr. Ferson, with other excursionists, was returning home after a day's outing, when a sudden squall drove their steamer against some hidden obstruction with such force as to open a gap in the hull of the vessel. The latter speedily filled and sank in a very few minutes. Seven persons lost their lives by this disaster.

The City Council of Shelbyville, Ills., at its last meeting, held on the 2d inst., voted unanimously for the adoption of a system of lighting the city by electricity, the same to be furnished by the Shelbyville Water Company. The Mayor, after investigating the matter, refused to sign the ordinance. Shelbyville, at last accounts, did not have a gas company, so that for once it cannot be claimed that the gas company "owns the Council."

I note a chronological error in the last issue of the *Scientific American*, for, in the course of an article copied from *Invention*, it is stated: "The first shop lighted in London by this new method (coal gas) was Mr. Ackerman's, in the Strand, 1840." The shop of Mr. Ackerman, according to "Newbigging's Handbook," and "King's Treatise," as well, was lighted 28 years earlier, or in 1812. Mr. Clegg, who had charge of that work, becoming the engineer of the chartered Gas Light and Coke Company during the succeeding year (1813), while from the same authority we learn that Mr. Winsor lighted Pall Mall in 1807.

Something of a flutter was caused in Chicago's financial circles by a rumor, which became current early in the week, to the effect that the Chicago Gas Light and Coke Company was about to issue $5,000,000 to $7,000,000 of bonds for improvements. Reportorial investigation failed equally to establish or disprove the truthfulness of the report, but a prominent broker, however, intimated a knowledge of the matter, and virtually admitted the fact of such an issue in the near future. He further stated that the Trust would, in October next, begin paying a quarterly dividend of one per cent.

At a recent meeting of the Municipal Assembly of St. Louis, Delegate Stern introduced a resolution, which he claims was offered in obedience to an apparent popular demand, to investigate the terms of the St. Louis Gas Trust agreement, into which the old St. Louis, the Carondolet and the water gas companies had entered. This investigation is to ascertain if the water gas franchise is being violated in the pooling of the business of the companies. Mr. Stern, in a subsequent interview, is reported as saying: "The newspapers and the people say they are pooling, and if that is so we want to know how and to what extent the law is being violated. The city is a stockholder in the St. Louis Gas Light Company, and especially for this reason we ought to know all about this secret business arrangement. When the committee is organized we shall go at once to the investigation of the organization of the Gas Trust, and discover, if possible, what it is and who is in it. We should have begun work on the investigation before, but it is likely to be an arduous and time-consuming affair, and we haven't had the time to give to it. After we begin we can continue our work beyond the adjournment of the Assembly, if we find it necessary."

A Fuel Gas Plant in Pittsburgh, Pa.

The *American Manufacturer* says that no little interest has been excited by the announcement that a plant is being built in Pittsburgh for the manufacture of fuel gas, and no little inquiry has been made as to the occasion for such a works. It was suggested that Pittsburgh, being so favored with natural gas, would certainly not require a fuel gas plant, at least until natural gas was practically exhausted, a time so far in the future as to make any preparation for such an event at this date somewhat previous.

Inquiry develops the fact that this plant is being erected by the Fuel Gas and Electric Engineering Company, Limited, which is a Pittsburgh organization, for the purpose of exhibiting their new gas making process for the manufacture of fuel gas in localities where natural gas does not exist, and to test coals from different sections of the country, in order to determine their fuel gas value for metallurgical, steam and domestic uses. This company believe that they have completely solved not only the problem of the economic production of fuel gas, but every question connected with the distribution and utilization of gas under pressure. The plant above referred to will be completed about the first of September, and will have a capacity for making fuel gas on a large scale—about a million cubic feet per day. Either bituminous or anthracite coal can be used as the basis of the process. The gas will have a higher heating power than what is known as water gas, will have a pungent odor, and its cost, when made in districts where coal is abundant—say, for example, in Cincinnati or St. Louis—will be so low that its use cannot fail to become universal. It is also believed that manufacturing interests using this method of producing fuel gas will be able to maintain themselves in respect to fuel cost against the competition of other centers where natural gas exists in abundance. There is practically no limit to the quantity that can be manufactured at the works erected upon the plans of this Company, whether the demand be for thousands or millions of cubic feet per day.

This Company, which has been engaged in perfecting its plans for some months, will be ready some time in September to furnish plans for the installation of a complete gas plant in any locality, covering not only the manufacture of gas, and its safe and economic conveyance, but also its utilization in the best manner. Their engineering plans have been carefully worked out, and are so arranged as to include, if desired, the utilization of present piping systems of illuminating gas plants, changing district by district from their present use to that of distributing heating gas, while, as we have already pointed out in the *Manufacturer*, they will be prepared to change the system of illumination from gas to electric lighting.

The Market for Gas Securities.

The ostensible market quotations for Consolidated gas have been of the most fantastic sort during the fortnight. At one time the operators on the bear side actually marked the asking price down to 72, a figure but slightly in excess of the one at which the shares sold when they first made their appearance in the street. Some genuine transfers undoubtedly took place at and below 73, but the sellers will live to regret their haste, for there is no valid reason why Consolidated gas should be rated at anything below 85. A recent issue of the New York *Daily Times* reports that a prominent member of the stock exchange, who has large interests in the Consolidated Company, explains the situation in the following manner:

"One of the features of the bearish attacks has been to assail investment shares. The bears find it easy to mark down prices, owing to the absence of speculative dealing; but oh, how hard to cover when the turn comes! The disorganization of holders and no concerted support invites attack. Just such an inviting danger to bears will Consolidated Gas prove. People will burn gas, good crops or bad crops; and, with an increase of consumption over last year of nearly 30 per cent., and with prospective increase of dividends, a short interest of over 10,000 shares and the assistance of the heavy investment interest, the bear raiders can be made to feel uncomfortable at 80, or even at a ten-point advance."

When the settling day comes many a bear on Consolidated will be troubled with a very sore head. At the close of last week the price hardened to 76, and every indication points to higher figures. Equitable is somewhat weaker, and Mutual shows no improvement. Brooklyn shares are neglected, although an occasional inquiry is made for old Brooklyn gas. We note that Williamsburgh is decidedly weak. Baltimore Con. has moved up a peg or two, while Chicago Gas Trust is bid for at 50.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks.

16 Wall St., New York City.

August 16.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	75¾	76
Central	440,000	50	30	—
" Scrip	220,000	—	47	57
Equitable	2,000,000	100	118	122
" Bonds	1,000,000	—	113	115
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	110	113
Mutual	3,500,000	100	93	96
" Bonds	1,500,000	1000	101	—
Municipal, Bonds	750,000		—	—
Northern	125,000	50	30	—
" Scrip	108,000			
Yonkers		50	—	80
Richmond Co., S. I.	300,000	50	50	—
" Bonds	12,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	104	106
Citizens	1,200,000	20	56	—
" S. F. Bonds	320,000	1000	—	103
Fulton Municipal	3,000,000	100	138	139
" Bonds	300,000		—	106
Peoples	1,000,000	10	60	62
" Bonds (5's)	368,000	—	97	—
" " (6's)	94,000	—	100	—
Metropolitan	1,000,000	100	82	84
Nassau	1,000,000	25	101	103
" Ctfs	700,000	1000	100	—
Williamsburgh	1,000,000	50	115	120
" Bonds	1,000,000	—	111	—
Out of Town Gas Companies.				
Boston (Mass.) Gas Co.	2,500,000	500	204	208
Buffalo Mutual, N. Y.	750,000	100	90	95
" Bonds	200,000	1000	95	100
Citizens, Newark	1,000,000	50	140	145
" " Bonds	45,000	—	—	—
Chicago Gas Trust	25,000,000	100	50	53
Cincinnati G. & C. Co.	6,000,000	100	187	188
Consolidated, Balt.	6,000,000	100	56	—
" Bonds	3,600,000		107	107½
Chesapeake, Balt.	1,500,000	100	75	80
"	1,000,000		100	102
Consumers Toronto	1,000,000	50	192	—
Central, S. F., Cal.			80	100
Capital, Sacramento, Cal.			57½	60
Hartford, Conn.	750,000	25	140	142
Jersey City	750,000	20	168	—
Laclede, St. Louis, Mo.	2,000,000	100	125	—
Louisville, Ky.	2,570,000	50	130	132
Little Falls, N. Y.	50,000	100	95	100
" Bonds	25,000	—	100	103

Advertisers Index.

GAS ENGINEERS. Page

Jos. R. Thomas, New York City ... 120
Wm. Henry White, New York City ... 120
Wm. Mooney, New York City ... 120
William Gardner, Pittsburgh, Pa ... 120

GAS WORKS APPARATUS AND CONSTRUCTION.

James R. Floyd, New York City ... 123
T. F. Rowland, Greenpoint, L. I ... 123
Deily & Fowler, Phila., Pa ... 123
Kerr Murray Mfg. Co., Fort Wayne, Ind ... 122
Stacey Mfg. Co., Cincinnati, Ohio ... 123
Bartlett, Hayward & Co., Baltimore, Md ... 113
Morris, Tasker & Co., Limited, Phila., Pa ... 122
Davis & Farnum Mf'g Co., Waltham, Mass ... 90
R. D. Wood & Co., Phila., Pa ... 122
Southwark Foundry and Machine Co., Philadelphia, Pa ... 122
Bouton Foundry Co., Chicago, Ills ... 119
Smith & Sayre Manufacturing Co., New Yotk City ... 123

PROCESSES.

National Gas Light and Fuel Co., Chicago Ills ... 114

GAS AND WATER PIPES.

Gloucester Iron Works, Phila., Pa ... 120
Mellert Foundry and Machine Co., Reading, Pa. (John Fox, Selling Agent, N. Y.) ... 120
Cincinnati and Newport Iron and Pipe Co., Newport, Ky ... 120
Ohio Pipe Co., Columbus, Ohio ... 120
Pancoast & Rogers, New York City ... 120
M. J. Drummond, New York City ... 120
Wells Rustless Iron Co., New York City ... 112
R. D. Wood & Co., Phila., Pa ... 122

GAS ENGINES.

Schleicher, Schumm & Co. Phila., Pa ... 128
Clerk Gas Engine Co, Phila., Pa ... 115

RETORTS AND FIRE BRICK.

J. H. Gautier & Co., Jersey City, N. J ... 118
B. Kreischer & Sons, New York City ... 118
Adam Weber, New York City ... 118
Laclede Fire Brick Works, St. Louis, Mo ... 118
Brooklyn Retort and Fire Brick Works, Brooklyn, N. Y ... 118
Borgner & O'Brien, Phila., Pa ... 118
James Gardner, Jr., Pittsburgh, Pa ... 118
Henry Maurer & Son, New York city ... 118
Chicago Retort and Fire Brick Works, Chicago, Ills ... 118
Baltimore Retort and Fire Brick Co., Baltimore ... 118
Oakhill Gas Retort and Fire Brick Co., St. Louis, Mo ... 118
Evens & Howard, St. Louis, Mo ... 119
Cincinnati Gas Retort and Fire Brick Works, Cincinnati, O. 119
Emil Lenz, New York City ... 119

SCRUBBERS AND CONDENSERS.

G. Shepard Page, New York City ... 121
R. D. Wood & Co., Phila., Pa ... 122

REGENERATIVE FURNACES.

Bartlett, Hayward & Co., Baltimore, Md ... 113
Fred. Bredel, New York City ... 119

GAS GOVERNORS.

T. C. Hopper, Phila., Pa ... 116
Connelly & Co., New York City ... 115

CEMENTS.

C. L. Gerould, Manchester, N. H ... 118

GAS ENRICHERS.

Standard Oil Co., Cleveland, Ohio ... 124

GAS METERS.

Harris, Griffin & Co., Phila., Pa ... 126
American Meter Co., New York and Philadelphia ... 127
The Goodwin Gas Stove and Meter Co., Philadelphia, Pa ... 127
Helme & McIlhenny, Phila., Pa ... 127
D. McDonald & Co. Albany, N. Y ... 127
Nathaniel Tufts, Boston, Mass ... 126

EXHAUSTERS.

P. H. & F. M. Roots, Connersville, Ind ... 114
Smith & Sayre Manufacturing Co., New York City ... 123
Wilbraham Bros., Philadelphia, Pa ... 115
Connelly & Co., New York City ... 115

GAS COALS.

Penn Gas Coal Co., Phila., Pa ... 125
Perkins & Co., New York City ... 124
Newburgh Orrel Coal Co., Baltimore Md ... 125
Despard Coal Co., Baltimore, Md ... 125
Chesapeake and Ohio R.R. Coal Agency, N. Y. City ... 125
Westmoreland Coal Company, Phila., Pa ... 125
Monongahela & Peters Creek Gas Coal Co., Pittsburgh, Pa ... 125

CANNEL COALS.

Perkins & Co., New York City ... 124
J. & W. Wood, New York City ... 124

VALVES.

Ludlow Valve Manufacturing Co., Troy, N. Y ... 116
John McLean, New York City ... 116
Chapman Valve Manufacturing Co., Boston, Mass ... 116
R. D. Wood & Co., Phila., Pa ... 122

ENGINES AND BOILERS.

Jarvis Engineering Co., Boston, Mass ... 115

PURIFYING MATERIAL.

S. H. Douglas, Ann Arbor, Mich ... 119
Connelly & Co., New York City ... 115

GAS LAMPS.

The Siemens-Lungren Co., Philadelphia, Pa ... 121
G. Shepard Page, New York City ... 88
Albo-Carbon Light Co., Newark, N. J ... 112
Standard Gas Lamp Co., Phila., Pa ... 119

PURIFIER SCREENS.

John Cabot, New York City ... 119
Geo. A. Mills, Baltimore, Md ... 119

GAS STOVES.

American Meter Co., New York and Philadelphia ... 117
The Goodwin Gas Stove and Meter Co., Phila. Pa ... 96

STREET LAMPS.

J. G. Miner, Morrisania, New York City ... 111
Bartlett Street Lamp Mf'g Co., New York City ... 116

BURNERS.

C. A. Gefrorer, Phila., Pa ... 124

STEAM BLOWER FOR BURNING BREESE.

H. E. Parson, New York City ... 120

GASHOLDER TANKS.

W. C. Whyte, New York City ... 112

GAS FIXTURES.

Mitchell, Vance & Co., New York City ... 116

COKE CRUSHER.

C. M. Keller, Columbus, Ind ... 125

GAS BAGS.

Peerless Manuf'g Co., New York City ... 115

ELECTRICAL APPARATUS.

Waterhouse Electric & Manufg Co., Hartford, Conn ... 112

Position Desired.

A man of correct habits desires a position

As Superintendent, Engineer, or Constructor of Gas Works.

Thoroughly understands water gas processes, as well as coal, oil, or wood gas. Perfectly familiar with the erection of gas works in every detail; also designing, drawing, analysis, photometry, etc. Will take a non-paying works and put it on a paying basis; or take charge of the erection of a works and manage it after completion. Address

676-2 "G. A. S.," care this Journal.

Engagement Desired.

The advertiser, an English Gas Engineer, age 25, seeks an engagement

As Gas Works Manager or Assistant Manager.

Thoroughly understands the manufacture and distribution of gas, and is a good draughtsman and chemist. Address

672-6t "H." care this Office.

FOR SALE,

Two Sinuous Friction Condensers,

Each 1 ft. 3 in. wide by 11 ft. 3 in. long, and 18 ft high, of sufficient capacity for 225,000 cu. ft. per day. Apply to

665-12 PETER COFFEY, Supt Gas Co., Peoria, Ill.

ENGLISH

"Journal of Gas Lighting."

Issued weekly. New volume commences Jan. 1, 1887. Price, $7 per annum. Subscriptions taken by

CHARLES NETTLETON, Agent for U. S.,

No. 115 Broadway, N. Y. City.

THE GLOBE STREET LAMP.

MINER'S PATENT STREET LAMPS.

Are adapted for use of Streets, Parks, Depots, Ferries, & Private Grounds.

WITH POSTS OR BRACKETS.

Jacob G. Miner,

No. 823 Eagle Ave., New York, N. Y.

THE ALBO-CARBON LIGHT.

THIS SYSTEM HAS SHOWN ITSELF IN THOUSANDS OF CASES—IN HALLS, CHURCHES, PICTURE GALLERIES, CONCERT HALLS, RESTAURANTS, BANKS, CLUBS, STORES, OFFICES, and PRIVATE RESIDENCES—TO BE THE

Best Adapted and Most Successful Method of Gas Lighting Ever Offered.

The SOFTNESS AND PURITY OF THE LIGHT make it most desirable for Office and Household Uses. Its BRILLIANCY and POWER render it unrivaled for lighting Halls, Churches, etc. Its ECONOMY secures for it general favor wherever used.

NOTICE.—Suits are pending in the United States Circuit Courts in Illinois and Pennsylvania against various parties for infringement of our Letters Patent No. 247,925, dated October 4, 1881, and No. 333,862, dated January 5, 1886. The first of these suits has come up for hearing, and an injunction has been granted therein. The second of said suits has not yet been reached for hearing. All persons are cautioned against manufacturing, selling, or using any apparatus or material which infringes our patents. We intend to prosecute all parties infringing patents owned by us.

ALBO-CARBON LIGHT CO. (Sole Manufacturers for the United States) **Main Office, Newark, N. J.**

ARC AND INCANDESCENT LIGHTING.

Steady Lights, Economy of Power, INSTANTANEOUS AUTOMATIC REGULATION,

ARE ALL CONTAINED IN

THE WATERHOUSE SYSTEM

A Complete System that will knock out competition and secure the trade. We invite the most critical investigation, as we have no "outs" to apologize for.

Send for Catalogue! **Send for Catalogue!**

THE WATERHOUSE ELECTRIC AND MFG. COMPANY,

Factory, Colt's West Armory. **Hartford, Conn.**

To All Whom It May Concern!

The SIEMENS-LUNGREN COMPANY hereby warns the public against the use of various infringing Regenerative Gas Lamps which are offered for sale. This Company has heretofore delayed bringing suit to enjoin the manufacture or importation of such infringing lamps, solely because of the practical worthlessness of the infringing devices; and although, in each instance, they infringe some one or more of the various patents owned or controlled by this Company, they have fallen into disuse sooner than any suit could be brought to a hearing. As, however, the introduction of these infringing lamps has tended to discredit the practicability of our Company's system of regenerative gas lighting, we have instructed our Attorneys, Messrs. Geo. Harding, C. S. Whitman, and Silas W. Pettit, to give notice that legal proceedings will in future be taken against all such infringers.

THE SIEMENS-LUNGREN CO., 21st St. & Washington Av., Phila., Pa.

Water & Gas Pipe.

RUSTLESS Send for New Catalogue. RUSTLESS

The WELLS RUSTLESS IRON COMPANY,

Nos. 7 and 9 Cliff Street, New York City.

GASHOLDER TANK CONSTRUCTION, ETC.

Gas Companies and others about to erect Gasholders will find it profitable to consult W. C. WHYTE, who for over thirty years has made a specialty of

Holder Tank Excavation and Mason Work.

Fifty tanks now in operation show the sort of work done. Address

W. C. WHYTE, No. 15 Cortlandt St., N. Y. City.

BOOKS.

DISTILLATION OF COAL TAR AND AMMONIACAL LIQUOR.

By GEORGE LUNGE. Price $8.50.

A TREATISE ON THE COMPARATIVE COMMERCIAL VALUES OF GAS COALS AND CANNELS.

By DAVID A. GRAHAM. 8vo., Cloth. Price $3.

Orders for these books may be sent to this office.

A. M. CALLENDER & CO.,
42 PINE ST., N. Y. CITY.